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THE DEVELOPMENT OF THE
TELEPHONE IN EUROPE. :: ::

By


Herbert Laws Webb, M.I.E.E.

With an Introduction by

Harold Cox.

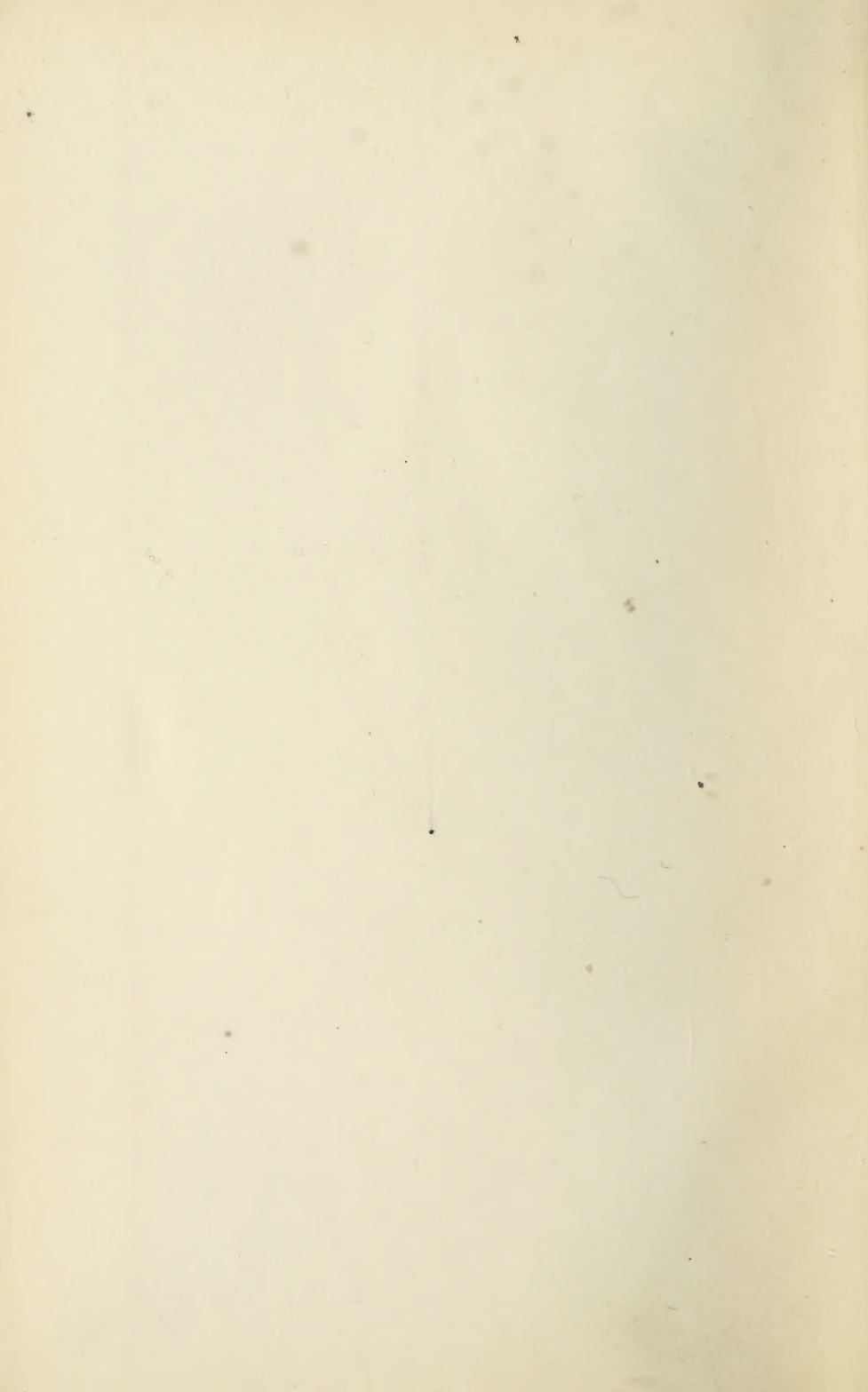
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The Development of the Telephone in Europe . .

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HERBERT LAWS WEBB, M.I.E.E.

Author of "A Practical Guide to the Testing of Insulated Wires
and Cables," "The Telephone Handbook," "The Telephone Service
Its Past, Present and Future," etc.

WITH AN INTRODUCTION

BY

HAROLD COX,

Formerly Member for Preston.

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INTRODUCTION.

OF all modern inventions there is none that has so greatly facilitated rapid inter-communication as the telephone. The writing of a letter takes time, and the conveyance of the letter to its destination takes much longer time. The telegraph is instantaneous so far as the conveyance of the electric signal between point and point is concerned, but it can only be used by expert operators, and the original message must be written at the dispatching end and transcribed afresh at the receiving end. The telephone, on the contrary, is instantaneous between individual and individual. The expert operator is only required to effect the communication between the two individuals wishing to speak to one another. The moment that has been done they can talk together almost as easily as if they were in the same room. There is no other means of communication which confers advantages even approaching those given by the telephone.

One might, therefore, imagine that the Government of a presumably intelligent country like Great Britain would do all in its power to facilitate the use of this important invention. In the following pages, Mr. Laws Webb, who has devoted special attention to the study of telephonic problems, lucidly tells the story of the dealings of the Government with the telephone, and shows how the public has been deprived of the full benefit which it might have derived from this wonderful invention. The trouble began with the purchase of the

telegraphs. In 1869, the Government decided to buy up the telegraphic systems of the United Kingdom, and an Act was passed which established a State monopoly in electric signalling. This measure was advocated and passed in the belief that the State would give a better service than the private companies were giving, and would, in addition, make a handsome profit for the benefit of the taxpayer. It is impossible to test the former assumption, because there is no means of knowing what improvements the telegraph companies would have effected if they had been allowed to continue the work which they had already advanced to such a high state of efficiency. The second argument in favour of State purchase can be more easily brought to a test. It was anticipated by the advocates of State purchase that the whole of the capital required to buy out the companies would be paid off out of profits in some fifteen years, and that the State would then be in possession of a magnificent uncharged property. As a matter of fact, after the first two years of State working all profits ceased, and in most of the subsequent years the Government has not even been able to pay interest upon the original capital. In addition, the taxpayer has constantly been called upon to spend large sums of money on capital development, for which not a penny of interest has ever been allowed. Finally, Parliament has latterly had to vote, year after year, a considerable sum of money to make up the deficiency in working expenses. If allowance be made for unpaid interest, the net annual loss on the working of the State telegraphs now exceeds a million sterling. Including the original purchase money of about £10,800,000, the aggregate loss in the forty years that have elapsed since the telegraphs were taken over by the State exceeds £35,000,000. As a commercial venture the State purchase of telegraphs has been a colossal failure.

That, however, is only one side of the loss inflicted

upon the British public by the mistaken policy of 1869. As soon as the Post Office had acquired the telegraphs it became necessary for it to keep at arm's length any possible invaders of its monopoly. The telephone was not invented till four or five years later, and on its appearance was treated by the officials of St. Martin's le Grand as a scientific toy. The moment it became evident that this toy could be used for commercial purposes the Post Office applied for an injunction against its use, and succeeded in the application. The result was that the development of the telephone became subject to the control of the Postmaster General, who, for many years looked at this new invention solely as a disagreeable rival to his telegraphic monopoly. The companies which were licensed to work the telephone were compelled to pay an exorbitant royalty of 10% of their gross receipts, and it is interesting to observe that down to the year before last the Postmaster General, in his published accounts, treated his receipts from this royalty as part of the revenue earned by him on working the telegraphs. In spite of this heavy handicap, and in spite of the unreasonable opposition of many local authorities to the granting of underground wayleaves, the telephone has made enormous progress, and the National Telephone Company is able to pay regular dividends on its invested capital. Next year that company will cease to exist, and the whole telephone system of the country will pass into the hands of the Government. Unless the experience of the telegraphs is totally reversed, we may expect in a few years' time that the telephones, instead of yielding a substantial profit to the investor, in addition to a heavy royalty paid to the State, will be a cause of heavy loss to the British taxpayer.

Even if this loss were accompanied by some compensating advantage to the users of the telephone it would not be justified. The persons who pay taxes and the persons who use telephones are not always

the same people, and it is unjust that the millions of taxpayers who do not make continuous use of the telephone service should be compelled to pay for the convenience of other persons—necessarily a minority—who do. The same consideration applies, of course, to the telegraphs. Only a minority of persons use the telegraph to any appreciable extent, yet every telegram dispatched is subsidised by the general body of taxpayers. There is, moreover, no reason to believe that even with the aid of the taxpayers' money the State will give a better service than private companies are capable of giving without State aid. In the United States, where both telegraphs and telephones are entirely in the hands of private enterprise, the service has reached the highest state of efficiency, and under similar conditions of freedom British commercial enterprise is certainly capable of attaining equally satisfactory results.

The root objection to State control of a telephonic or telegraphic system, as Mr. Laws Webb so admirably shows in the following pages, is that the State by its organisation is ill-adapted for commercial enterprise. Ministers and Parliaments necessarily look at all problems from the political point of view, and no commercial enterprise can be successfully managed if its control is swayed by political influences. This consideration applies not only to matters determined by the higher authorities, such as questions of rates and facilities, but also to the detailed conduct of the business. For in a State undertaking every employee knows that his position is controlled by political rather than by commercial forces, and he therefore has not the necessary motives to induce him to assist in making the business a commercial success.

These general considerations are illustrated by Mr. Laws Webb in detail. He shows, point by point, how political control prevents commercial success, and he shows how strikingly the extension of the telephone

system in the United States contrasts with its relative stagnation in this country and in Europe generally. Such a work is peculiarly valuable at a moment when the Government of Great Britain, in continuation of the gigantic blunder made in 1869, proposes to make an even more serious blunder, and to subject to the benumbing influence of State management one of the most marvellous inventions of the human mind.

HAROLD COX.

LONDON, *January*, 1911.

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CHAPTER I.

THE RISE OF THE TELEPHONE.

The rapid expansion of the Telephone in America, and its slow growth in Europe. The universal need for Telephone Service—the quickest means of communication. The early history of the Telephone. The causes of low telephone development in Europe.

IT is now approaching thirty years since the telephone service was established as a means of intercommunication, as the first telephone exchanges were built in the early eighties in almost all the principal cities of the civilised world. A statement of telephone statistics recently compiled from official returns shows that at the beginning of 1910 the whole of Europe contained in round figures 2,584,000 telephones, equivalent, for the aggregate population of Europe of 400,000,000, to 6·4 telephones per thousand of population. In the United States there are about 24,000 telephone companies or systems, having in round numbers a total of 7,000,000 telephones, equivalent, for a population of 80,000,000, to over 87 telephones per thousand inhabitants.

It is well-known that there is no State monopoly in the telegraph or telephone in the United States. Thus there is practically "free trade" in telephony in America, and consequently there is a large number of telephone companies operating all over the country, in rural as well as in city districts; and in some of the large cities there are two companies working independent services. But what is known as the "Bell" system, comprising the original telephone companies connected with the American Telephone and Telegraph Company, the parent telephone concern of the United States, contains a total of 5,142,692 telephones, scattered over the whole continent and interconnected by toll lines and long distance lines so as to form a universal system of telephonic intercommunication. Taking this general system alone and eliminating the independent companies, which are not connected with the general telephone system of the

country, we find in America 64 telephones (of the type having universal service) per thousand inhabitants, as against only 6·4 telephones per thousand inhabitants in the whole of Europe.

This comparison is so striking, the development of the telephone in America is so greatly superior to that reached in Europe, that it is a matter of serious interest to set out the causes which have produced such widely different results.

The Essential Characteristics of the Telephone Service.

That telephone communication fills a universal need will not be contested by any thinking man. The high development of means of communication is an index of high civilisation, and the figures of railway, post office, and telegraph traffic are customarily accepted as evidence of the commercial and social activity of a country or a community. The telephone service is the most rapid means of communication there is, and it is difficult to estimate how much the efficiency of the average business man is raised by the enormous facility for communication placed at his disposal by a highly efficient and highly developed telephonic service. In social as well as in business affairs the telephone service saves time and abridges distance in a manner approached by no other means of communication. How much this is so can be realised when it is considered that the work done by a telegram and reply is done more effectively by telephone in about a thirtieth part of the time. While many people do not realise these simple facts until they are thoroughly explained and demonstrated, it is fair to assume that had the general public of the principal European countries had the same opportunities of availing themselves of telephonic communication as have been offered to the public of the United States, and had the telephone in Europe been made as efficient as it has been made in America, there would have been something approaching the same development of the telephone in Europe as in America.

The actual telephone development in Europe is, as the above figures show, only a tenth of that of the American Bell system, in proportion to population, and only a fifteenth of the whole telephone development of the United States. Taking the European countries individually one finds that there are only six which have a development of over ten

telephones per thousand inhabitants. These are Great Britain, Germany, Sweden, Switzerland, Denmark, and Norway. France, Holland, and Belgium come a long way behind the above-named countries; and in the rest of Europe, including such important countries as Russia and Austria-Hungary, the development of the telephone is insignificant.

The Early History of the Telephone.

A brief sketch of the history of the telephone in Europe will show the fundamental reasons why this most useful means of communication has hitherto had such a stunted development in the greater part of the European Continent. When the telephone was first brought over from America there were few, except the American enthusiasts who came over as pioneers and a sprinkling of European business men, who could see any commercial future in the wonderful invention of Graham Bell. The scientific beauty of the invention was everywhere enthusiastically acknowledged, but the practical value of it was openly derided; and the opinion that the telephone was merely a scientific toy—a phrase given currency by telegraph officials—was very generally adopted.

Here we have an illustration, at the very beginning of the history of the telephone, of one of the greatest difficulties which has obstructed its development in Europe. It was most naturally assumed at the beginning that the telephone was an offshoot of the telegraph, and as the telegraph is throughout Europe a State monopoly, it was to Government telegraph officials that the telephone was first brought. Government officials are not famed for being the most far-sighted people, and in this case there was a pardonable touch of human nature in their attitude of distrust and dislike towards a competitor which might have in the future a serious effect on the business in which they were engaged.

Although European telegraph officials at first derided the possibility of the telephone being developed into a practical means of general intercommunication, they were, in most European countries, strongly opposed to any opportunity being given for the commercial development of telephonic communication. Broadly speaking, though there may have been some differences of detail in different countries, the story

of the beginning of the telephone in Europe was this : The telephone was taken to the Government Telegraph Departments and offered for sale, but the Telegraph Departments declined to take the risk of developing a totally new business. At the same time, however, they assumed control over the telephone and issued licences to companies formed to exploit the new invention, these licences being generally for restricted periods and surrounded by the most onerous conditions.

A little later, when practical experience had shown that telephone communication was not only thoroughly practical but filled a distinct public want, the jealousy of the State Telegraph Departments asserted itself, and, with few exceptions, the telephone companies were absorbed by the State, and the telephone became, like the telegraph, a rigid Government monopoly. Thus, to-day the telephone is a State monopoly in Germany, France, Austria-Hungary, Switzerland, Belgium, Italy, Greece, Bulgaria, Servia, and Roumania ; and it may be added that, with the exception of Germany and Switzerland, the development of the telephone in all these countries is extremely low. The exceptions to exclusive State monopoly up to the present are Great Britain, Russia, Spain, Portugal, Sweden, Norway, Denmark, and Holland, although in these countries the State has assumed a very large measure of control over the conduct of the telephone business, and will no doubt eventually convert it into a State monopoly.

In the countries where the telephone has so far been largely under commercial management the development of the telephone is considerably higher than in those where for a long time past it has been a State monopoly. Thus, in Great Britain there are $2\frac{1}{2}$ times as many telephones in proportion to population as in France, where the telephone has been a Government monopoly since 1889 ; and in the Scandinavian countries, where private enterprise has had a large measure of scope, and commercial methods have to a certain extent impressed themselves even on Government Departments, the relative development of the telephone is very largely superior to that of Belgium, France, Germany, Austria-Hungary, and the remaining countries of Europe which are afflicted with a State telephone monopoly.

CHAPTER II.

THE EVOLUTION OF THE TELEPHONE SERVICE.

Great development and high efficiency of service attained in America, under private enterprise, by efficient organisation and advanced technical and commercial practice. The restriction of telephonic development and efficiency in Europe by political control; the repressive influence of the policy of State monopoly.

TO explain the reasons why the exercise of a Government monopoly in the telephone and of excessive Government regulation of the telephone, such as we have had in this country, have so largely restricted the development of the telephone service, it is necessary to describe briefly the evolution of the telephone business. The evolution of the telephone industry may be roughly divided into three periods. First, there was an experimental period when the whole business was entirely new, and when both apparatus and commercial practice suitable to the conduct of the telephone service had to be developed. Second, there came a period when most of the principal difficulties involved in constructing and maintaining an efficient telephone system had been conquered, and third, there came a period in which the correct commercial methods of dealing with the telephone service on a large scale and of giving it the greatest possible development were arrived at. This is briefly the history of the telephone in America, which is the only country where it has been developed, or is in process of being developed, to its utmost capacity.

For about ten years the service was extremely crude, and the commercial practice was equally crude. Everything in a totally new business had to be learned. Apparatus which would work accurately and consistently had to be developed, systems of line and cable construction which would satis-

factorily transmit telephonic currents had to be designed, and innumerable electrical and mechanical problems had to be solved, largely by trial and error. During this period the performance of the telephone very often failed to satisfy the public ; and while the facilities for communication were so great—when things worked well—as to cause a considerable demand for telephone service, things so frequently worked badly that the service was often abused in unqualified terms.

At the same time the commercial practice was almost as crude as the technical part of the work. At the beginning of the telephone exchange business it was considered that a telephone was merely an instrument to be hired out for so much a year, regardless of whether much or little use was made of it, and the telephone and its connecting line were the principal units on which the charge for service was based. As in most towns only a single exchange was established, and as the initial rate for service within a small radius of the exchange was fixed at a high enough point to give what the managers considered a safe average return, the price demanded for the service was considered high by a large proportion of the public and, owing to the mileage charges on long lines, became actually very high in all parts of the towns far distant from the central exchange, so that the telephone was considered a luxury, and the development in its use was proportionately small.

This experimental period of inefficient service, relatively high charges and low development, lasted in America for about twelve or fifteen years after the establishment of telephone exchanges, but by the end of that period sufficient progress had been made with telephonic apparatus to insure a much more rapid and reliable service, and sufficient experience of the commercial side of the telephone business had been gained to enable a more practical tariff to be devised. In the 'nineties very rapid advance was made both on the technical and commercial side, and with the modifications of the tariffs which brought the telephone service within reach of much larger classes of the community than had hitherto availed themselves of it, the ideas of telephone men as to the future possibilities of the telephone became greatly enlarged and an era of rapid development set in—to such an extent

that within the past ten years the Bell system in America has increased from 400,000 telephones to over 5,000,000.

The high pitch of efficiency and the high pitch of development to which the telephone service has been brought in America are very largely due to the spirit of organisation and unity of purpose which has inspired the management of the American Bell Companies. These companies, working under a centralised management, have in reality been brigaded together as one great organisation with a single policy—the technical and commercial advancement of the telephone service. The impulse given to the industry by a dominating policy, by uniformity of technical and commercial practice, is perhaps the most effective element in producing the sound and efficient development of a complicated and highly specialised service. Without this centralised organisation and persistent policy of improvement the advance of the telephone in America could not have been so rapid or so effective as it has been.

The Status of the Telephone in Europe.

Turning now to Europe, we find that to a large extent the telephone in Europe, at least in many countries, has not sensibly progressed beyond the first or experimental period ; at any rate, it has not approached yet the period of high efficiency of service, scientific tariffs and enlightened commercial practice which began in American telephony from twelve to fifteen years ago.

In most countries where the telephone is a rigid State monopoly the telephone plant has not been brought up to date, but still largely consists of apparatus of a type in use fifteen or twenty years ago, and, of course, relatively inefficient. The single exchange district, with relatively high rates for distant parts of the towns, is still the practice, the old flat rate scheme of tariffs is still the practice, and the active commercial policy of advertising the telephone service and catering to the wants of all sections of the public, which has been so largely the cause of the rapid development of the past ten years in America, is entirely neglected. In the countries where private enterprise is still largely responsible for the conduct of the telephone service, the principles which have had such successful results in America have been adopted, and

this accounts to a large extent for the relatively higher development of the telephone in these countries than in those where a rigid State monopoly has existed since the early days of the telephone. Even in these more enlightened countries, however, the expansion of the telephone has been much restricted by State regulation, and it has not been possible to attain the same rate of increase as is shown by America.

Even when the technical work is well done and the service is efficient and well maintained, and a tariff and other features of commercial practice are adopted which make for sound progress, telephone development on a large scale must still always be principally a matter of capital investment, and a free flow of capital cannot be obtained for a business which is hedged round by all sorts of regulations and restrictions, and is conducted under a limited tenure. In the United Kingdom, for example, a large proportion of the exchange systems are fully as well equipped as those of the United States, are in fact of identical type, while the tariff and general commercial practice are fully as progressive as those of the American telephone companies ; but the fact that the telephone company here has been working under a limited licence, which terminates shortly, and is to be terminated under conditions of uncertainty as regards repayment of capital, has made it impossible to develop the telephone system of the whole country on the same broad scale as has been the policy of the American telephone companies for years past. To develop efficiently a city telephone system requires the constant expenditure of capital years in advance of the actual requirements of the moment, and it stands to reason that certainty as to the future is one of the essential requirements to encourage this constant flow of new capital.

Wherever the telephone business be closely investigated it will be found that even when the plant is relatively efficient and the organisation good, a low rate of development is principally due to the lack of capital expenditure to provide facilities for the constantly increasing public demand. This is, of course, one of the most important causes of the low development of State telephone monopolies. State telephone monopolies are invariably operated as part of the Post Office and telegraph departments, and as these departments through-

out Europe do not generally pay their way, notably the telegraph and telephone branch, capital for further development of the telephone system is not easily forthcoming. Therefore, in the case of a Government monopoly we have not only the restricting effect of antiquated plant and technical methods (and consequently inefficient service), the restricting effect of a total absence of scientific tariff and of modern commercial methods, but also the absolute brake on progress of lack of capital for development.

It is not to be questioned that many of the engineers and administrators in charge of European telephone systems are enlightened telephone men, fully alive to the possibilities of wide development of the telephone service when operated on commercial lines; but their hands are tied by the routine of a great Government administration and by the insuperable difficulties of obtaining capital in sufficient quantity to reconstruct antiquated plants and to build telephone systems on the comprehensive scale required by modern ideas of the telephone business. The curse which lies over the telephone business throughout Europe is political control, which absorbs an industry through mere jealousy of its possibilities as a competitor of another State monopoly, only to throttle it and to stunt its growth.

There are a few rare exceptions where the Government officials who have had charge of the telephone have to a certain extent realised its possibilities and developed it even to a greater extent than their first love, the telegraph. This is notably the case in Switzerland, which provides a brilliant exception to the ordinary run of State telephone monopolies. In Switzerland the telephone has been largely developed as a substitute for the telegraph, and the telephone has become so much more popular than the telegraph that in the past year the receipts of the Swiss Administration from the telephone were more than two and a half times as great as the receipts from the telegraph. In Switzerland distances are relatively short, and the low rates imposed on the telephone department by the political authorities encourage a large short-line inter-urban traffic, the telephone rate for short distances being actually cheaper than the telegraph rate, though the service rendered is greater and the plant used more expensive.

General experience is that the telephone does not compete so actively with the telegraph as the telegraph officials of most countries at first feared it would. The telephone has created new ways of doing business, and has created its own traffic; and telegraph and telephone traffic have grown side by side. The direct competition occurs where short distances are concerned, and is naturally favoured by artificial rates, fixed, as generally occurs under Government control, without regard to the real cost of conducting the business.

In Sweden, Denmark, and Norway, the political authorities have had more enlightened views on the utility of telephone development than have obtained in the larger European countries, so that greater scope has been given to private enterprise; while also it is fair to say that the Government officials who have had direct charge of telephone work have been more progressive in the Scandinavian countries than in some other parts of Europe, so that in Scandinavia both the company systems and the Government systems are better developed than in the central and southern parts of Europe, and the general efficiency and utility of the telephone service are vastly superior.

CHAPTER III.

AMERICAN AND EUROPEAN TELEPHONE DEVELOPMENT COMPARED.

How European communities are deprived of the most rapid means of communication. Wasted opportunities. Early telephone work in Europe. The restrictions imposed by short-sighted political authorities.

PERHAPS the most effective illustration of the much more restricted progress made in Europe with the telephone as compared with America is to show for the different European countries the number of telephones which would be in service if the rate of development in proportion to population had been the same as in America. In this comparison the figures relating to the Bell system will be used, and not the figures of the total development of the telephone in America, which include the statistics of the various independent companies. In many cases the independent telephones are duplicates of the Bell telephones, and as the Bell system is a general system, giving universal service, the fairest comparison is between that system and that of any European country; a comparison of the total telephone development of America with the total development of every European country would naturally give much more striking results.

In Great Britain there were at the beginning of 1910 602,209 telephones in service. If the telephone system of Great Britain were developed on the same scale as the Bell system of America, there would now be about 2,670,000 telephones in service in Great Britain.

In the German Empire, including Bavaria and Wurtemberg, there were 940,966 telephones in service at the beginning of 1910, but if the development were on the same scale as that of the American Bell system there would now be 3,700,000 telephones in service in the German Empire.

In France at the beginning of 1910 there were 211,728 telephones, whereas if the French telephone system were developed on the same scale as the American Bell system there would be over 2,500,000 telephones in service in France.

In Sweden at the beginning of 1910 there were 173,784 telephones in service. If the Swedish telephone system were on the same scale as the American Bell system, there would be 346,000 telephones in service in Sweden. Here it will be noted that the difference is not so great, as, for the reasons given above, the development of the telephone in Sweden is exceptionally good among European countries; the Swedish results, which are relatively high for the country as a whole, are somewhat aided by the very aggressive competition in Stockholm between the State telephone department and the Stockholm Telephone Company. These two have between them 66,900 telephones in Stockholm alone, or more than a third of the telephones in all Sweden.

Russia had, at the beginning of 1910, approximately 127,000 telephones in service. If the telephone development of Russia were on the same scale as that of the American Bell system, there would be more than 6,000,000 telephones in Russia, instead of a little over 100,000.

Austria-Hungary had, at the beginning of 1910, 146,156 telephones. Telephoned to the same extent as the United States, Austria-Hungary would have 2,950,000 telephones.

Switzerland, as already noted, one of the comparatively well telephoned countries of Europe, had, at the beginning of 1910, 73,758 telephones. If, however, the telephone development were on the same scale as that of the American Bell system, Switzerland would have 225,000 telephones.

Denmark, another comparatively well telephoned country according to European standards, had, at the beginning of 1910, 73,843 telephones. If the development were on the same scale as that of the American Bell system there would now be in Denmark 164,000 telephones.

Norway, also high up in the scale for Europe, had, at the beginning of 1910, 58,026 telephones, but telephoned on the same scale as America, it would have 154,000 telephones.

Now we come to a group of far more backward countries, and the figures will show what vast scope there is for telephone

development in several European countries having numerous large towns and cities and a large industrial population.

Italy, at the beginning of 1910, had 62,266 telephones. If the telephone development in Italy were on the same scale in proportion to population as that of the United States, Italy would have no fewer than 2,150,000 telephones.

Holland, at the beginning of 1910, had 51,421 telephones, but if telephoned on the same scale as the United States, would have 352,000 telephones.

Belgium, at the beginning of 1910, had 42,540 telephones. Telephoned on the same scale as the United States, Belgium would have 450,000 telephones.

Spain, at the beginning of 1910, had approximately 19,000 telephones. Telephoned on the same scale as the United States, Spain would have about 1,800,000 telephones.

The comparison for the remaining small European countries, such as Portugal, Greece, Servia, Bulgaria, and Roumania, would work out in about the same proportions as for Spain. Each of these countries has in proportion to population about one telephone for over sixty in America.

If the whole of Europe were as well telephoned as America, there would be about 25,000,000 telephones in Europe in place of the 2,584,000 which actually exist.

It is quite true that in several countries of Europe the nature of the population and the habits and requirements of the people do not favour the rapid development of such a means of communication as the telephone service, but this qualification does not apply to the greater proportion of European countries, and certainly it does not apply to the larger and more highly civilised and industrial countries, such as England, Germany, France, Russia, Austria-Hungary, Belgium, Holland, and Italy. The inhabitants of most of these countries would probably resent the imputation that they were less highly civilised than those of America, that their commerce and industry were less well organised, the life of their cities and towns less active, and their general capacity for taking advantage of improved means of communication lower than that of the inhabitants of any other country. And, indeed, they would be quite right, for it is an axiom with all means of communication and public facilities

of the kind, that the existence of the facilities creates the demand. If an efficient and well-developed telephone service is supplied, the inhabitants of any town or city on the face of the earth will gladly use it and quickly come to rely upon it in their daily life. There is little doubt that the inhabitants of Rome, Madrid, Paris, or St. Petersburg, or even Constantinople would use the telephone just as freely as those of Boston, Philadelphia, or San Francisco do, if an efficient service were supplied, and if the system were developed in the progressive fashion typical of American telephone enterprise.

Indeed, although the peasant farmer of European countries is usually supposed to be about the most conservative individual on earth, it is highly probable that if the opportunity were put before him he would learn to use the telephone almost as rapidly as the American farmer has learnt to use it during recent years—so great is the value of telephonic communication in rural and sparsely settled districts. It is not to the lack of enterprise or of adaptability on the part of the general public of European countries that the low development of the telephone in Europe must be attributed, but rather to the lack of enterprise and energy on the part of those who have assumed control of the telephone in most European countries. The field is there in every case, but in most instances the tillers have stood still and let the plough rust.

Early Telephone Work in Europe.

If, then, we study the history of the telephone in the various European countries, we find that with one exception the work of establishing and developing telephonic communication was at first taken up by commercial companies working under a licence or concession from the Government. The exception is Germany, where from the beginning the Imperial Post Office refused to allow a telephone company to start business, but arrogated to itself the right to supply telephone service to the public. In Great Britain, France, Austria-Hungary, Belgium, Holland, Switzerland, Russia, Denmark, Norway, and Sweden, telephone companies were organised and started work in the early 'eighties with the crude apparatus which was then available. Even in Germany a beginning was made in organising a telephone company, but the German Post Office

compensated the enterprising organisers and took over the nucleus of the system before it was established as a business.

In most of the licences or concessions granted to the early telephone companies the various Governments reserved the right to buy out the companies at stated intervals, generally at periods from five to seven years apart, and in almost all cases the Government reserved to itself the privilege of building and operating the trunk or long-distance lines between towns. In a large proportion of cases the Government option to purchase the telephone systems was exercised at a very early date, as soon as it had become evident that the telephone service was a practical and remunerative business, and the telephone became a Government monopoly in France in 1889, in Belgium and Switzerland about the same time, and in Austria and Hungary a few years later. In other countries the misfortune of a complete Government monopoly has not yet overtaken the telephone business, but the strings of Government control have been drawn tighter, and it has become increasingly difficult for those telephone companies which still exist to develop their business along normal lines.

CHAPTER IV.

THE TELEPHONIC HISTORY OF GREAT BRITAIN.

The repressive policy of the British Post Office. How the existence of the State Telegraph Monopoly has resulted in checking the development of the Telephone in Britain. Post Office jealousy of telephonic progress. The transfer of the trunk lines.

GREAT BRITAIN has had perhaps the most interesting telephonic history of any European country, and the vicissitudes of the telephone business in this country well illustrate both the evils of excessive political interference with a technical industry and the wonderful vitality of the telephone business, which has enabled it to develop on a relatively large scale in spite of continuous and powerful efforts to hamper and restrict that development. No sooner did the first telephone companies begin to do business in England than suit was brought against them by the Post Office for infringement of the Postmaster-General's legal monopoly in telegraphy.

This monopoly was conferred on the Postmaster-General by the Telegraph Act of 1869, which empowered the Post Office to buy up the various telegraph companies then existing, and to organise a Post Office telegraph service. The desire for a legal monopoly in telegraphy had been expressly disclaimed by the Post Office witnesses who appeared before the Select Committee which examined the Telegraph Bill, and the Select Committee reported against a monopoly being granted, but the monopoly clause was inserted—for safety's sake, no doubt—as the Bill was going through Parliament, and became law. Ten years later it was used to assert proprietorship over the telephone, and although the telephone had not been invented until six years after the passage of the Act, the definition of a telegraph was found to be so widely drawn as to include the telephone or any other means of sending and receiving electric signals, with or without wires.

Consequently the decision went against the telephone, and an arrangement was come to between the telephone companies and the Postmaster-General under which the companies agreed not to appeal against the decision, and the Postmaster-General agreed to grant licences to the telephone companies to continue their business, on certain terms.

These terms were sufficiently onerous, the licence being limited to 31 years from the end of 1880, and the licensee being obliged to pay the Post Office a royalty of 10 per cent. of the gross receipts from the telephone exchange business. At first licences were granted for certain small areas only, but after some years the Postmaster-General, impelled by strong criticism in Press and Parliament of the obstructive attitude of the Post Office towards the telephone, changed his policy, and granted licences for the whole Kingdom. Later still it became the policy of the Post Office to grant no further telephone licences, either for the whole country or for restricted areas, until the passing of the Telegraph Act of 1899 gave the municipalities powers to establish telephone systems, and the issue of licences to those municipalities which applied for them became compulsory on the Post Office.

The relations between the Post Office and the telephone companies having been settled by the licence of 1880, and the Post Office having secured by the royalty clause a substantial share of all future revenue from the telephone, it might have been thought that the attitude of the Post Office and the Government towards the telephone would have become one of benevolent encouragement. But, unhappily, the Government officials have never been able to regard the telephone companies otherwise than as chartered infringers of the luckless telegraph monopoly of the Post Office, which, great organisation as it is, has never paid its way, and to-day costs the taxpayer about £1,000,000 a year to maintain. The Post Office have watched the growth of the telephone with a sleepless jealousy, and all the forces of the bureaucracy—almost irresistible forces, even in this free country—have been continuously used to harass and restrict the activities of the telephone companies.

One of the most powerful hindrances to a sound telephone development has been the refusal of statutory powers to the

telephone companies to run their wires. In the early days the telephone companies on various occasions promoted Bills in Parliament to obtain these powers—which the Post Office of course enjoys—but the whole influence of the Government of the day was exerted against these Bills, and they naturally failed to pass. Consequently the telephone companies have been dependent on private wayleaves, and on private agreements with the various local authorities which control the streets, for powers to build their line plant. In some cases the local authorities have pursued a policy of deliberate obstruction and have refused to allow the construction of modern underground systems of telephone distribution, thereby hampering the development of the telephone and restricting the efficiency of the service—to the natural disadvantage of the public.

Among the worst offenders in this respect have been the London County Council and the City Corporation, which have long obstructed the sound development of the telephone in London by refusing to allow the telephone company to build underground work. The inconsistency as well as the injustice of such an attitude is evident when it is considered that the moment the Post Office is empowered to build a telephone service in London it takes up the streets in all directions without saying with your leave, or by your leave. But the municipalities naturally take their cue from the central Government, and it having been the policy of the Government from the first struggle with the early telephone companies persistently to harass the telephone industry, many of the local authorities have done their best along the same lines.

Even working under these very serious difficulties, however, the telephone made rapid progress in Great Britain, though how much more rapid progress would have been, had the conditions under which the industry was conducted been as encouraging as they were discouraging, it is difficult to estimate. Companies were formed to develop different sections of the country, and after a period of educating the public in the value of the new means of communication (by the simple expedient of supplying prominent business people with free service for a time), the telephone service began to take a firm hold on the business community. The Post

Office at first tried to compete with the telephone companies in different places, but as a Government Department can never compete successfully with a commercial concern these attempts were failures, and the company systems grew while those of the Post Office remained stagnant or disappeared. The Post Office still maintains a few provincial telephone systems, either relics of these early days of competition or serving areas where there is no company service ; but, like the Post Office telegraph service, these systems are conducted at a substantial loss.

After some ten or twelve years of development under diversified management, the various telephone interests amalgamated, between 1889 and 1892, into the National Telephone Company, and numerous improvements in organisation and in general methods resulted from this amalgamation. The rates charged to the public were reduced in a number of towns from £20 to £10 for flat rate service, and plans were made for adopting underground construction in place of overhead in those towns where wayleaves for laying underground cables could be obtained. About this time the expiry of the original Bell telephone patent in England encouraged schemes for starting competing telephone services in a few places. A small company was organised in Manchester and installed a crude telephone system on a very small scale, which gave service for a few months and was then sold out to the established company. A new telephone company on a larger scale was organised by the late Duke of Marlborough to establish a competing service in London, but this company also amalgamated with the National Telephone Company before beginning active operations.

The Long-Distance Service : The Transfer of the Trunk Lines.

In 1892, a fresh attack was made on the telephone business by the Post Office. During the previous seven or eight years the telephone companies had established trunk lines between various towns, and had built up quite a successful long-distance telephone service, which was largely used by the business public. The Post Office found that this long-distance telephone communication had a certain effect on the telegraph traffic ; as the telegraph business of the Post Office had for many years been

conducted at a loss, it might be considered that the Post Office officials would be glad to see their telegraph traffic contract rather than expand, and so reduce the loss ; but the officials took the opposite view and raised an agitation for the transfer of the trunk telephone lines to the Post Office. An agreement was eventually come to between the Post Office and the National Telephone Company, involving the limitation of the operations of the National Telephone Company to certain defined areas and the transfer of all the trunk lines to the Post Office. According to the view of the Telephone Company an important part of the understanding arrived at, though not expressed in the agreement, was that the National Telephone Company should be protected from competition in the local service during the remainder of the licence ; but the existence of this understanding was afterwards denied by official witnesses at the Parliamentary Telephone Inquiry of 1898, and there the matter must be left. In giving up the trunk lines, however, it is fairly clear that the Telephone Company gave up that which would have made their position in the future impregnable against any attempt at competition in the local service, since for business purposes a purely local telephone service—without long-distance facilities—has a relatively small value.

The trunk telephone lines were finally transferred to the Post Office in 1896, and the Post Office adopted a new scale of rates for trunk calls and put in hand the construction of a number of lines to extend the trunk system to many new places. Incidentally, it may be mentioned here that by making rates for trunk telephone calls of 3d. for 25 miles, and 6d. for 50 miles, the Post Office officials introduced trunk telephone rates which compete very powerfully with their own telegraph rate, and in the hands of the Post Office the trunk telephone service became definitely a cut-throat competitor of the telegraph service. The effect of the extremely low trunk telephone charges for short distances is evident in the financial returns of the Post Office, which show that the average value of a conversation on the trunk lines is only 5·9 pence. As the minimum charge for a telegram is 6d., it is clear that the trunk telephone service competes most effectively with the telegraph service.

CHAPTER V.

THE TELEPHONIC HISTORY OF GREAT BRITAIN—(*continued*).

Incidents of the policy of official obstruction. The Glasgow Inquiry of 1897; the Parliamentary Inquiry of 1898; the Telegraph Act of 1899. The London Agreement of 1901. How political schemes miscarried. Municipal competition in Telephony and its failure. The costly experiment of the Glasgow Municipality.

THE opposition to the development of the telephone which had been the steadfast policy in official circles provoked a long-drawn-out Parliamentary Inquiry in 1895. Before this Select Committee the proposal to establish competing municipal exchanges was exhaustively discussed, and was condemned by all competent expert witnesses. Owing to the dissolution of Parliament this Committee made no report, but it has been stated that the draft report recommended the purchase of the entire telephone system of the country by the Government.

Municipal Telephony.

For some years past one or two of the municipalities, notably that of Glasgow, had been agitating for permission to establish municipal telephone systems. The persistent agitation of the Glasgow Corporation finally resulted in the Treasury Inquiry at Glasgow in 1897, to inquire into the efficiency and adequacy of the telephone service supplied by the National Telephone Company in Glasgow. This inquiry lasted about ten days, and the desire of the Glasgow Corporation to establish a municipal telephone service was fully ventilated. The report of the Commissioner appointed by the Treasury to conduct the inquiry was entirely adverse to the Glasgow Corporation and in favour of the Telephone Company. The Commissioner freely condemned the tactics of the Corporation, and pointed out that the Company had been prevented from improving the efficiency of its service by the

refusal of the Corporation to allow the Company to put down a modern underground plant in Glasgow.

This victory of common-sense over organised agitation and obstruction was not permanent, however, as continued agitation against the sound development of the telephone resulted in a further Parliamentary Inquiry in 1898. The Select Committee was presided over by the late Mr. R. W. Hanbury, then Secretary to the Treasury, and the representative of the Post Office in the House of Commons (the then Postmaster-General being the Duke of Norfolk), and the inquiry was conducted in a manner markedly hostile to the telephone interests. The inquiry was a very extended one, and expert witnesses both from the Post Office and from the National Telephone Company were bullied and brow-beaten in a manner quite unusual in Parliamentary Inquiries. The result was a triumph for municipal and official obstruction, as the Committee reported in favour of active competition in the telephone business, and on the strength of the Committee's report Mr. Hanbury introduced a Bill into Parliament which became the Telegraph Act of 1899, and empowered the Post Office to grant telephone licences to the municipalities, and granted £2,000,000 to the Post Office to establish a competing telephone service in London.

The main object of this measure was to encourage such active competition in telephony as would destroy, or at least largely diminish the value of the National Telephone Company's undertaking against the time when the Post Office would succeed to the telephone business at the expiry of the original licence at the end of 1911. In practice, however, matters worked out differently. With the exception of Glasgow, where the Town Council had for several years nourished a persistent agitation for the privilege of establishing a municipal telephone service, and of four or five other towns where promoters and agitators succeeded in arousing the interest of the Town Council in telephone competition, the Telegraph Act of 1899 was practically disregarded by the municipalities. A few obtained telephone licences from the Post Office, but in the end only six municipal telephone systems were started, and after a very short experience of the difficulties of the telephone business, four municipalities were glad to sell their

systems to the Post Office and to the National Telephone Company. Within six years after the passage of the Telegraph Act of 1899 municipal telephony had lived and died !

The Telephone Development of London.

With regard to the competition in London, Mr. Hanbury's Act similarly miscarried. Mr. Hanbury had advocated a strenuous competition between the Post Office and the National Telephone Company in supplying telephone service to Londoners ; but when the question was approached in a practical way by practical men, the difficulties of starting a new system in a great city to undermine, by means of competitive rates, the position of a large and well-established system, were considered to be too great to warrant the expenditure of public money on such a wasteful and unpractical form of competition. In the end an agreement was come to in 1901, between the Post Office and the National Telephone Company, under which the two concerns virtually agreed to share the telephoning of London, to charge the same rates, and to give an intercommunicating service.

When this agreement was made public, there was a great hue and cry in the Press, as the politicians had planned for and had promised a cut-throat competition which was to annihilate the Telephone Company ; but experience has proved that it was a sound and practical measure. Instead of throwing away public money on a competition which would certainly have been unsuccessful, and instead of inflicting on Londoners the annoyance and inconvenience of two separate telephone systems, the Post Office has assisted in the telephone development of London, and the expenditure made on the Post Office London system has gone to increase the facilities of the general telephone service, instead of being spent on a separate and isolated system which would have been of little practical value.

The combined systems of the National Telephone Company and Post Office in London now contain over 160,000 stations ; as far as the telephone-using public is concerned all these telephones belong to one system, and so great has been the increase in telephonic facilities, due to the agreement for intercommunication, that it now seems ludicrous that in 1901

the agreement should have been styled "The Telephone Betrayal" by the hysterical section of the Press. If the large capital expended by the Post Office in London had been spent by the National Telephone Company in extending the original system along uniform lines, the results would have been still better and far more economical, as a certain amount of duplication of plant and organisation would have been avoided; but the intercommunication agreement has been fully justified both by the experience gained in London and by that of Glasgow, where the opposite policy of cut-throat competition was adopted by the municipality and quickly ended in failure.

The value of intercommunication is also shown by the case of the Hull municipal system, which is simply a small annex of the National Company's Hull exchange. By the threat of forcing the National Company to remove its underground plant the Hull Town Council obtained free intercommunication, and the Hull municipal telephone system virtually lives on the much larger and older-established business of its neighbour. Without intercommunication it would have died the death long ago, or, by a quiet political deal, would have been sold to the Post Office.

The Glasgow Town Council spent over £360,000 between 1901 and 1906 in building an opposition system to that of the National Telephone Company in Glasgow, and then, having got into both practical and financial difficulties, sold the system to the Post Office for £305,000. The waste of capital is not by any means measured by the amount lost by the Glasgow Corporation, as a large amount of the plant taken over by the Post Office was of such a character as to require complete replacement by modern equipment, and the duplication of plant at Glasgow caused by the strenuous competition of four or five years was naturally on a large scale. It is probable that the waste of capital through the Glasgow telephone competition, due to duplication of facilities and to the adoption, for the sake of cheapness, by the Glasgow Corporation of plant which was not up to the standards of recognised telephone practice at the time, will amount in the long run to not less than £250,000, probably to a good deal more.

Municipal Telephone Difficulties.

The municipal telephone campaign was accompanied by a great deal of noisy agitation, and as the municipalities exert such powerful political influence, they first obtained full scope to indulge in experiments in telephone competition, and later were relieved, at the taxpayer's expense, of the financial loss which those experiments involved. But the municipal incursion into the telephone field had little effect on the general development of the telephone in Great Britain, and served only to demonstrate the wastefulness and futility of competition in the telephone service. The telephone service differs from other means of communication in that the value of the service to each user depends on the scope and uniformity of the system as a whole. Two competing systems in the same district simply split the inhabitants of that district into two isolated telephonic camps, so to speak.

This fundamental feature of the telephone service—that its value to the user, the public, lies in the extent of the facilities for general intercommunication—was ignored by the promoters of municipal telephony. But the bearing of this fundamental fact is that in a telephone competition the two competitors engage in a life and death struggle to obtain, or retain, the larger share of the public patronage, and so obtain the more valuable system of the two and that which in the long run must attract all important customers and become the survivor.

It was in such a struggle, with a well-established and experienced adversary, that the few municipalities which started competitive telephone systems embarked, but the incapacity of a municipal department to compete successfully with a well-organised commercial concern made it impossible for any of them to overtake the National Telephone Company or seriously to shake its position; the business public, not being governed either by sentimental considerations or by political influence, naturally clung to the system which gave the greatest facilities and the most efficient service.

Therefore, within a very short period municipal telephony, from which so much was expected by its political and other sponsors, had shot its bolt and ceased to be a factor in the active development of the telephone. Had a greater number

of municipalities taken up the work than actually did, and had the municipal telephone systems—notably that of Glasgow, which was the pioneer and was generally looked to as an example—been better organised and conducted more in accordance with the technical requirements of the telephone business, there might be a different story to tell. As it was, municipal telephony in Great Britain was a failure, politically, financially, and practically, and has become a mere passing incident in British telephone history.

CHAPTER VI.

THE TELEPHONIC HISTORY OF GREAT BRITAIN—(*continued*).

The problem of the expiry of the National Telephone Company's licence. The Agreement of 1905. The strangling effect of the Agreement on present and future telephone development. The Post Office telegraph monopoly and its future telephone monopoly compared. The Government's disregard of the essential characteristics of the telephone business.

THE failure of the municipal telephone movement became evident within a very few years after the passage of the Telegraph Act of 1899. By 1904 it was clear that effective competition on a general scale was not to be expected from the municipalities, and as Mr. Hanbury's suggested active competition by the Post Office had been negatived by the Post Office officials themselves, there remained no further hope of destroying the National Telephone Company's business, and it became incumbent on the politicians to find some solution of the problem of 1911.

The problem is this: When the original licence was drafted neither side to the transaction looked forward to the time when it would expire, and no provision was made for the continuance of the service after the expiry of the licence on December 31st, 1911. As matters stood, on that date the Telephone Company would cease to have the right to conduct the telephone business, and that was all. The politicians and officials have aroused an unfriendly sentiment in Parliament towards the Telephone Company, and although the great majority of Members of Parliament are wholly unacquainted with either the practical or the technical features of the telephone business, and complacently ignore the deplorable financial results of the Post Office telegraph monopoly, it is understood that Parliament would not favour a renewal of the licence, but prefers the conversion of the telephone business into a Post Office monopoly.

This, of course, has always been the natural desire of the Post Office officials, and doubtless the transfer would have taken place long ago had not the rapid expansion of the telephone business caused the capital concerned to become so quickly an imposing sum. Therefore the purchase of the whole business, often contemplated, has always been postponed, in the hope of something turning up to the advantage of the Post Office. The last hope was Mr. Hanbury's scheme of ruthless competition, and this having signally failed, it became necessary to consider in reasonable time the situation which would arise after 1911, when the whole telephone service of the country would stop, unless the licence were renewed or the plant were purchased by the Post Office and continued in operation.

Under the agreement of 1901 respecting the joint operation of the London service, the Post Office undertook to buy the London plant of the National Telephone Company at the end of the licence; taking this agreement as a model, an agreement was finally arrived at, in 1905, extending the scope of the London agreement to the telephone plant of the whole country. This agreement was referred to a Select Committee which sat through the summer of 1905, and, with some modifications, it was approved by Parliament in August of that year. Strong efforts were made by the municipal politicians to upset the agreement, and the proposal that the Post Office should build duplicate telephone systems throughout the country, so as to avoid the necessity of purchasing the National Telephone Company's plant, was seriously argued before the Select Committee.

It is this agreement which now governs the situation of the telephone business of Great Britain, dooming it to become a Government monopoly. The agreement is already exercising a strangling effect on telephone development, and, by checking plans and construction for future requirements, creating a situation which will cause many difficulties in the future. The governing feature of the agreement is that the Post Office is to purchase the plant at its value as working plant *in situ*, without allowance for goodwill or for past or future profits. Regard is also to be had to the suitability of the plant for the purposes of the telephone service of the Post

Office. Under these terms it is evident that the National Telephone Company, which has built up a great business under very difficult and discouraging conditions, and has organised and developed a great public service to a high pitch of scope and efficiency, is treated with discouraging harshness and parsimony. The politicians and officials may be within the letter of the licence and of the law in dictating such terms, but such a policy towards those who have provided the capital to develop a great technical industry does not encourage the enterprise which is necessary for the development of new industries and is really the vital force of any industrial country.

The Telegraph Transfer of 1870 and the Proposed Telephone Transfer Compared.

The great financial failure made by the Post Office with the telegraph monopoly has always been a source of friction between the Treasury and the Post Office, and doubtless the political authorities were anxious that the results of the proposed telephone transfer should be more favourable to the Government than those of the purchase of the telegraph systems; so advantage was taken of the fixed termination of the telephone licence to dictate the lowest possible terms for the purchase of the telephone plant, and the Telephone Company, faced by a legal sentence of death due on a fixed date, had no recourse but to accept the terms.

The conditions of the proposed telephone transfer and those of the telegraph transfer of 1870 are widely different. When the Post Office took over the telegraph companies telegraphy was in an early stage of development—still in its experimental period—and several of the systems bought out were poorly organised and equipped. Undoubtedly the telegraph companies received favourable terms—they were not anxious to sell, and the Post Office officials were feverishly anxious to buy and to silence opposition to the scheme for a Government telegraph monopoly. But the price paid for the telegraphs is not in any way the cause of the financial failure of the Post Office telegraph monopoly. The Post Office has never conducted the telegraph business on commercial lines; it keeps no telegraph capital account and pays no interest even on the original purchase money. The telegraph capital

account was closed in 1879, and the interest is paid out of the Consolidated Fund, so that the original cost of the telegraphs to the Post Office has no bearing whatever on current financial results. The reason why the Post Office telegraphs lose money is that a Government Department, subject to political control, cannot conduct a technical business on commercial lines.

In the case of the proposed telephone transfer we have an industry which, unlike the telegraph in 1870, has long ago emerged from its experimental period and has been developed to a high pitch of organisation and efficiency. The principal problems have all been solved ; we know what kind of plant to use to give an efficient service, what tariffs to adopt to secure a large development ; and the general organisation of staff and the commercial management of the telephone service have become highly specialised subjects. Therefore in taking over the telephone system the Government will be taking over a highly organised concern, working on lines that are the result of experience gained from a long period of experiment and development and conducting a thoroughly sound and remunerative business. Moreover, given enterprise and skill in the general management, the telephone business is capable of almost indefinite expansion. This is clear from the record of the telephone in America ; and it is only a question of capital expenditure and administrative skill for the development of the telephone in Great Britain to be increased tenfold within a few years.

In view of these facts—that the telephone service is a safe, profitable, and growing business, with, given adequate management, a limitless future before it—the Government could well afford to compensate reasonably those who have risked their capital during the trying and obscure period of experiment and early development. That the contrary policy, of giving the minimum possible price for the plant without any allowance for goodwill, has been followed in framing the purchase agreement is relatively unjust, and certainly illiberal ; and it is already producing results which will seriously handicap both the efficiency and the development of the service when it becomes a Government possession.

One of the essential features of sound telephone develop-

ment, and one of the essential requirements for high general efficiency of the service, is constant provision of plant for the future. It is a common mistake to regard a telephone system as a plant having a fixed and limited capacity. On the contrary, the telephone system of any town is (or should be) in a constant state of change and growth. It is necessary to study for long periods in advance what the telephonic requirements of the district will be, and to provide from time to time certain sections of the plant—buildings, switchboards, conduits and cables—on a scale considerably greater than the actual requirements of the moment call for. Unless this is done systematically there will arise congestion of the plant, lack of facilities, and consequent loss of efficiency in the service. It is not only to supply the wants of future subscribers that this margin of spare facilities must be provided, but also to maintain the day-to-day efficiency of the service. Existing subscribers frequently require changes in their telephone installations, increasing or altering their equipment, or because of removal from place to place. The traffic tends constantly to increase, and unless there is a certain elasticity in the plant obtained by the systematic provision of spare facilities, inconvenience and inefficiency are sure to result. The policy of the Government towards the Telephone Company ignores this important feature of telephone development, and the agreement of 1905, by limiting the purchase terms to working plant at its value as working plant, expressly discourages the construction of plant with a large margin of spare capacity, and so discourages work which is absolutely necessary for the proper development of the telephone and for the maintenance of a high standard of efficiency.

Under ordinary circumstances the Telephone Company would now (1910) be spending capital in plant all over the country, much of which would not come into use until long after 1911, and therefore would not be revenue earning during the period of the licence. Under the terms of the agreement the Post Office would be entitled to try, and undoubtedly would try, to buy this plant at less than its cost price; so clearly it is not business for the company to expend capital on such future requirements. If the management of the telephone system were to be continuous, or if the purchase terms

had been drawn with a due regard to the real conditions of the telephone business, this future plant would be constructed, in accordance with regular practice, well in advance of the requirements of the moment. But the harsh terms of the purchase agreement necessarily put the brakes on advance capital expenditure, and the normal development of the telephone system all over the country undergoes a check for several years.

Thus it is seen how the repressive policy of Government monopoly casts its shadow before, and even long in advance of its actual realisation exercises a strangling effect on a business where active development and an enterprising policy of providing for the future are essential factors for satisfactorily meeting the requirements of the public. When the Post Office succeeds to the telephone service it will succeed to a congested plant, without proper facilities for expansion and without proper development studies to govern plans for future construction. The result will naturally be a long period of embarrassment and bad service, and probably an expenditure, to cope with the situation, much greater than would have been involved had the situation been faced in an intelligent manner beforehand and the purchase terms arranged in accordance with the natural requirements of the telephone business.

It is at this point that the development of the telephone in the United Kingdom stands at the moment of writing. While there is yet time for some solution to be found which will avert the overhanging evil of Government monopoly, it does not seem likely, having regard to the apathy and prejudice with which technical industrial questions are regarded in political circles, that any endeavour will be made in that direction. That a Government telephone monopoly, even in England, will be progressive, efficient, and financially successful nobody with any knowledge of the subject believes; but, equally, nobody with any knowledge of the subject believes it possible to convert the political authorities to a sound view of the evils of Government monopoly.

CHAPTER VII.

SOME REASONS FOR POPULAR PREJUDICE AGAINST THE TELEPHONE.

Unenterprising management in the early years of the business. The direct use of the telephone by the public accentuates difficulties. Telephone rates. The education of the public. General inefficiency of Government monopolies. The causes of the low efficiency of the telephone service in Europe.

REVIEWING the history of the telephone service in England, and in Europe generally, it must be candidly admitted that the early telephone companies did not appreciate the importance of their mission, and did not make the most of their opportunities. The service was necessarily bad in the early days, because the appliances were extremely defective. But in America more reliable apparatus was rapidly evolved, and the general organisation of the service was studied and improved with greater effect than on this side of the Atlantic. The European telephone companies in general pursued a cautious and conservative policy, which ill-accorded with the requirements of a business which in America was soon found to be capable, under enterprising management, of almost indefinite expansion.

Somewhat arbitrary methods of dealing with customers, and a policy of extreme reticence—of avoiding the circulation of any information regarding the difficulties and peculiarities of the telephone business—added to the unpopularity which the early telephone companies incurred. It is a curious fact that telephone administrations are unpopular all the world over, as far as unpopularity can be gauged from the flouts and gibes of the newspapers, which are generally supposed to represent public opinion.

This unpopularity partly arises, I am convinced, from the exasperation caused by the failure of a telephone call, which happens occasionally from one cause or another in the best organised systems, and, being a direct personal experience of

an individual, always causes a deep impression. In other services a failure may occur—as for example, a lost letter—unnoticed ; but the public uses the telephone personally, and therefore every failure is immediately and directly felt by some individual. This is a fundamental and ever-present reason why the highest attainable efficiency is indispensable in the telephone service ; and the failure to recognise this by Government telephone administrations is the main cause of general dissatisfaction with the telephone service throughout Europe.

The rates charged for telephone service have also in the past given rise to much public complaint. There was a tendency in the early days of telephony to regard the telephone as a luxury, and to charge for it accordingly, and European telephone companies in general were slow to follow the example of the American companies in adopting the practical measured rate tariff, which gives low prices for small users, charges each customer in proportion to service rendered and has been a powerful factor in extending the development of the telephone. Given all these difficulties—defective plant and service, an unpractical tariff, somewhat arbitrary methods of dealing with the public and a policy of extreme reticence—it is not to be wondered at that the early telephone companies achieved a substantial measure of unpopularity.

Of late years these methods have all been radically altered. American experience has largely been availed of, and the standard of equipment of the modern telephone system in England is as high as that of America ; in fact, the plant used is exactly similar. The tariff has been greatly revised, and a system of measured rates introduced, and for a long time past the National Telephone Company, by means of trained commercial departments, have pursued an enlightened policy of educating the public in the advantages of the telephone service, and in its proper use.

The Evils of Government Monopoly.

If I were asked to summarise the progress of the telephone in Europe in the past thirty years, I should say that the telephone companies have learned their business, while the Government telephone administrations have not. Moreover,

it seems hopeless ever to expect Government administrations really to learn the telephone business, because efficiency and enterprise are the two essential features of telephone work. Government officials are the first to admit that high efficiency cannot be expected of the mass of Government employees, owing to the permanency of their employment ; and it is common knowledge that the efficiency of a Government department is only about 50 per cent. of that of a well-organised commercial concern. Enterprise is out of the question in a Government department, especially in a Government telephone department, which is merely an inferior branch of the Post Office, which in turn, in most countries, is a branch of some division of the great machine of State.

The whole tendency of Government methods and of the routine of Government departments is to repress individual initiative and to stamp out any willingness to take responsibility. It is not to be imagined for a moment that the ordinary civil servant, however intelligent and however scientifically accomplished he may be, can conduct a Government telephone administration with the efficiency and progressiveness, or with the economy, which would be required of the head of a commercial organisation. Even if he had the will and the expert knowledge to enable him to do so, he would not be allowed, under Government methods, to exercise the necessary power and responsibility. Therefore the fundamental characteristics of Government management are all against a Government telephone monopoly being either efficient or progressive, or being conducted in accordance with commercial principles. Linked to the unprogressive Government telegraph monopoly, the telephone business, from being the highly specialised industry which it really is, sinks to a mere sub-department of the Government service. In this position, which it has long occupied in many European States, it becomes relatively stagnant, and both the real requirements of the telephone service and its possibilities are unheeded and uncared for.

Apart from the fact that the Government telegraph departments which have controlled the telephone have not been willing—despite the wonderful development obtained in America—to recognise the possibilities of telephone development, they have always made the fundamental error of giving

greater importance to a popular rate than to efficiency of service. High efficiency is the whole story in telephony. As has been said above, the public becomes temporarily a part of the telephone system during every call, and feels directly and resents acutely every difficulty, however small ; but there is another point which insistently demands constant and ever-increasing efficiency, which is that unless a telephone call can be completed immediately its object and its purpose are often gone, and the whole transaction becomes a failure. With a written message, once written and dispatched, the sender has to trust to luck whether it reaches its destination quickly or slowly, mutilated or intact. But a telephone call is a spoken message, and the reply is to be obtained on the spot ; the speaker is waiting to speak it from the moment he reaches for the telephone, and seconds seem like minutes when one is waiting at the telephone ; moreover, if the seconds swell into minutes, and the minutes into half-hours or hours (as happens daily in every European long-distance service) the delay in many cases entirely destroys the value of the call, and makes it purposeless or useless.

The Causes of Telephonic Inefficiency in Europe.

It is generally admitted that a Government department cannot obtain as high efficiency from its staff as a commercial organisation, because the discipline and training of the staff in Government employ cannot be as effective as with a commercial concern. All the world over, Government employees are wont to consider themselves superior persons, and in no service do the manners and mannerisms of superior persons create so much friction or so lower the general efficiency as in the telephone service. But the Government telephone administrations, in dealing with the long-distance service, have entirely lost sight of the extreme rapidity which is the whole value of telephone communication, and have made cheap rates, without regard to the real financial requirements of the business, and then have practically left the service to take care of itself ; with the result that in hardly a single European country is there a long-distance telephone service worthy of the name. In fairness it must be stated that this policy of fixing uncommercial rates is generally due to the political

authorities, and is often contrary to the views of their technical subordinates.

In America the suburban and long-distance telephone services always strike Europeans as phenomenally rapid. In point of fact, the suburban service in America is almost as rapid as the local service, and the delay in "getting through" to points within a radius of 30 or 40 miles of the large cities is always to be measured in seconds; in the long-distance service an average delay of a few minutes is the standard maintained, and it is rare for a call between any two of the large cities to be delayed over ten minutes. So accustomed is the American public to this standard of service, that a delay of over ten minutes in a call, say, from Boston to New York, or New York to Philadelphia, Washington or Chicago, would give rise to complaint. This is a real telephone service, and it is the kind of service that the public of every country really demands, because the public, in the long run, always puts efficiency first.

The Government telephone administrations, partly through lack of understanding of the telephone business, partly through political considerations, have put cheap rates first and efficiency second. It is impossible to give a high-speed and reliable long-distance telephone service at the rates currently in force in Europe, and make the service pay its way, because the American standard of service is only attainable by elaborate organisation of plant and staff, and specially by keeping the capacity of the plant in advance of the requirements of the traffic. This is expensive work, the requirements of the traffic being largely determined by the busiest hour of the day, and the busiest hour represents a large proportion of the total traffic of the 24 hours. In European telephone administrations it is the general practice to let the traffic constantly overwhelm the facilities, so that the usual daily condition of every long-distance line is that there is a long list of people waiting to use it, and some calls are delayed for hours. Even with this habitual delay, the long-distance telephone service finds many users, because the cheapness of the rates and the volume of communication obtained in a three-minute telephone call make the telephone compete favourably with the telegraph; but this does not constitute a real telephone service, and it cannot be doubted that the business public would willingly

pay higher rates were a standard of service maintained which would enable the user always to rely on a long-distance call being completed within a few minutes.

Although the long-distance telephone service is better equipped in England than in most of the Continental countries, the general efficiency of the service, due to defective organisation and lack of understanding of the real requirements of the telephone service, is very inferior. With a "trunk call" in Great Britain it is a pure matter of luck whether one obtains a result in minutes or hours. Consequently the service is not a tenth as useful to the business public as it would be if it were organised and conducted according to the standards set in America.

It is common knowledge among those familiar with the subject that the great majority of complaints made by business people in England against the telephone are due to the inefficiency and unreliability of the trunk service. The Post Office, in their trunk telephone business, have made the common mistake of telegraph administrations of fixing too low rates and leaving the service to take care of itself, or to be taken care of by telegraph people, who do not as a rule understand the telephone business; the low average rate per trunk telephone call in England—5·9 pence—is clear evidence that the chief public use of the trunk service is for the short distances, where the price of a telephone call undercuts the price of a telegram. For the average value of the call to be 5·9d. the great majority of calls must be 3d. and 6d. calls, which are very much cheaper than sixpenny twelve-word telegrams—so it is evident that the public puts up with the relatively slow service for the sake of cheapness.

CHAPTER VIII.

THE ESSENTIAL FEATURES OF TELEPHONE POLICY.

Efficiency the prime requisite. Reasonable rates ensure constant development. Development requires continuous capital expenditure. British Post Office telegraph and telephone finance. The present loss on the telegraphs and probable future loss on the telephones. The technical progress of British telephony. Reasons for more rapid progress in America. A summary of the development of the telephone service and of telephone policy.

THE essence of the telephone service is efficiency—and here efficiency means rapidity combined with accuracy and reliability. High efficiency is vastly more important to the business public—indeed to all sections of the public—than apparent cheapness, and low rates accompanied by relative inefficiency are only apparently cheap. Until Government telephone administrators make this maxim their guiding principle, and also succeed in sufficiently convincing their high political chiefs of its soundness, so that the latter shall have the courage of their convictions when defending the telephone administration against agitation and political pressure, there will be no hope of a Government telephone service becoming the highly efficient public servant it is capable of becoming. Reasonable rates, capable of yielding a satisfactory return on the capital after providing adequately for working expenses, are necessary for the proper development of the telephone, because this development—to which no end can be seen—calls continuously for fresh capital expenditure. Neither private enterprise nor Government can afford to provide this constant flow of capital unless it is to be remuneratively employed.

The indifference with which Parliament and public regard the large annual loss on the Post Office telegraphs is altogether indefensible in a business community. The hopeless condition

of Post Office telegraph finance has led to the general adoption of an unreasonable theory that the telegraph system ought to be maintained by the taxpayer for the public convenience. But there is no sound basis for this view, as most telegrams are sent by those who can well afford to pay for them. Moreover, it is a view absolutely inconsistent with the promises of the Post Office when the telegraph monopoly was established, which forecast great economies under Government working and sufficient profits to pay off rapidly the purchase capital ; and it is a view inconsistent with the general financial policy of the Post Office, under which strenuous resistance is made to every sacrifice of revenue demanded by reforms in postal charges. To extend the unsound finance of the telegraph monopoly to the telephone business and to teach the public to regard the telephone as well as the telegraph as a system to be maintained for the general convenience regardless of commercial principles, would be a certain means of checking the development of the telephone, because the large sums of capital continually required would not be forthcoming if they were to be unremuneratively employed.

The richest country could not afford to throw million after million into a bottomless pit such as Government management has made of the Post Office telegraphs. Therefore commercial rates for telephone service are a necessary factor in the sound development of the telephone ; and inadequate study of the important question of telephone tariffs and lack of conviction and courage in applying and maintaining correct rates are contributory factors in the general failure of Government monopolies to give the telephone service the development and usefulness of which it is capable.

It should be said here that the British Post Office, thanks to the discussion of their telegraph and telephone finance in Parliament, have adopted a form of accounts for their telephone systems which precludes the Post Office telephone work from becoming such a financial bottomless pit as the telegraphs have become. In the telephone accounts a capital account is shown, and as the accounts are presented annually to Parliament and all new capital expenditure must be approved by Parliament, there is little danger of telephone finance and general management getting totally beyond control, as

telegraph finance and general management did in the early days of the telegraph monopoly. But these accounts show very clearly how much more costly is Government management than commercial management. It appears that whereas the working expenses of the National Telephone Company are only 56·6 per cent. of the gross receipts, those of the Post Office local telephone services are 73·5 per cent. of the gross receipts. The Post Office accounts are favoured by the fact that rates and taxes are not paid by the Post Office and rents are not charged in respect of buildings occupied by telephone services, whereas these charges, and doubtless others not included in the Post Office accounts, have to be met by the Telephone Company ; so that if a strictly accurate comparison could be made the economy of commercial working would be still more emphatically demonstrated. Even as they stand, however, the Post Office telephone accounts are a serious warning of the economic disadvantage of transferring the whole telephone business of the country to Government management.

The Technical Progress of British Telephony.

As regards the technical progress of telephony in Great Britain, it may be said that the National Telephone Company and the Post Office have for some years past been occupied in transforming their plant from the old-fashioned magneto system to the modern central battery system. This transformation was effected on a general scale much earlier in America, where central battery plant has been standard practice for about ten years. Here again we have an illustration of the evil effects of political interference and obstruction on a technical industry. When the central battery system was perfected, over ten years ago, the advantages it gave in automatic signalling, increased accuracy and rapidity of working, and more economical and stable maintenance caused the existing magneto system at once to become obsolete. The American telephone companies, having an unlimited future before them, and having in all cases full underground wayleaves, were able at once to undertake the complete reconstruction of their plants, discarding the magneto system and adopting uniform central battery plant.

Such a wholesale reconstruction, for example, involving the rebuilding of every exchange and the re-equipment of every station, was carried out in New York in three years, and completed in 1901. This measure naturally involved large capital expenditure and heavy depreciation, since much working plant was scrapped long before its natural period of renewal ; but it put the telephone service on a new footing of high efficiency and complete uniformity of working, and therefore was a measure justified to those who were animated by the single motive of sound development of the telephone service and who were able to work untrammelled by external influence. But the position of the National Telephone Company has been very different ; the limited tenure, the uncertain future of the business, the frequent changes of Government telephone policy, the obstruction of the local authorities with regard to underground work, have all been restraining influences which rendered impossible the rapid and wholesale reconstruction of plant which was so desirable, and forced on the Company a more cautious policy of capital expenditure than that followed under the freer conditions of the telephone business in America.

Consequently the technical progress of the telephone service has been materially slower on this side of the Atlantic than on the other, and this has naturally reacted on the development of the system and on its general usefulness to the public ; efficiency is the best possible advertiser, and high efficiency in the telephone service is not practicable without a uniform plant of modern type. If it had been possible to complete at an earlier date the general reconstruction of the telephone systems which is still in progress in the United Kingdom, both the development of the British telephone service and its usefulness to the public would have reached long ago a much higher plane.

A Summary of Telephone Policy.

In the preceding sketch of the development of the telephone in the United Kingdom, the general principles which govern the sound development of the telephone service have been referred to here and there, but in order to judge of the progress made in the rest of Europe it will be as well here, before

describing the telephone conditions in Continental Europe, to recapitulate these general principles, as it is by them that telephone progress in Europe must be measured.

The sound development of the telephone service requires a combination of enlightened technical policy and enlightened commercial policy. The former includes all engineering matters, some of which in telephone work, notably the study of telephonic transmission, are of a highly scientific nature. The latter includes such questions as the adoption of correct tariffs, the education of the general public in the advantages of the telephone, and a constant study of the requirements of the telephone-using public. The commercial policy of telephony is almost as technical in its way as the engineering branch of the industry and splits itself up into a variety of branches. To secure rapid expansion of the telephone system, which simply means to give the telephone service its greatest possible usefulness to the public, it is necessary that the whole organisation should be backed by adequate capital resources, and for this flow of capital to be maintained the capital must be able to earn its living. These are in brief the general principles by which the development of the telephone is governed, and it is by them that telephone progress in Europe must be judged.

The technical progress of telephony has been relatively rapid when it is considered that when the telephone was invented there were no appliances in existence by which a telephone exchange service could be conducted. The earliest exchanges were constructed by means of adapting to the work crude appliances borrowed from the telegraph, but it was necessary to devise the whole telephone exchange system from the beginning. The early switchboard systems were based on the use of electro-magnetic indicators for signals, actuated by a magneto generator at the subscriber's instrument, and this system is currently known as the "magneto system." The lines were at first single wire with earth return. To overcome the interference caused by induction, the single wire line was later abandoned in favour of the metallic circuit; and with the introduction of metallic circuit working material improvements were made in the switchboards.

A distinct step in advance was the branching switchboard with self-restoring indicators; this gave better electrical

conditions and quicker operating. In 1898, or within twenty years of the establishment of the first commercial telephone exchanges, the central battery system of exchange working was evolved, and this effected a revolution in telephone exchange equipment. The central battery system abolished the magneto generators and the local transmitter batteries from the subscribers' stations and rendered the signalling for calling and disconnection automatic operations, effected simultaneously with the lifting and replacement of the receiver ; this, by making the disconnection signal no longer dependent on the memory of the subscriber, removed one of the greatest sources of inaccuracy and inefficiency in the working of the service.

The central battery system, with its central supply of energy for operating signals automatically, has given rise to a host of improvements making for more accurate and more rapid working. This great advance in equipment has been accompanied by a great improvement in traffic organisation ; and this is a vital feature in telephone management, for just as the efficiency of the battleship depends in the long run on the efficiency of the man behind the gun, so does the efficiency of the telephone system depend on the efficiency of the girl behind the plug. On the selection, training and supervision of telephone operators, a great amount of attention is now concentrated ; and the traffic staff of a modern telephone system is a highly organised body of special workers, governed by the most careful instructions, checked and supervised by the most minute and searching tests and guided by the most elaborate statistics.

To the mind of the engineer it is perhaps a weak point in the telephone system that in the long run the efficiency of the entire expensive plant and elaborate organisation is dependent on the young woman operator, but those who have given the subject the closest study are convinced that the young woman operator—that is, a human brain and set of fingers (and the young woman is found to possess the best combination for the purpose)—is a necessary feature to cope with the great range of selection required in the telephone service. The automatic telephone exchange, of which several highly ingenious varieties have been devised by different inventors,

does not meet the conditions under which the telephone service has to be operated to-day. The full automatic exchange transfers the working of the service from the expert operator, who can be trained and supervised, to the inexperienced member of the public who cannot be trained or supervised.

Moreover, in great city telephone systems there is such an immense variety of calls made daily, many of which for various reasons require special handling, that the automatic system breaks down economically, as a large proportion of the calls would in any case have to be handled by human operators. It is for these reasons that the automatic exchange, although technically practical and operative, has made little headway and has been adopted only to a limited extent in isolated systems. The present trend of technical progress is in the direction of employing automatic apparatus for the completion of the connection, a method which has the advantage of retaining a simple telephone set in the hands of the public, and of preserving oral communication between the user and the operator.

Reverting for a moment to the commercial policy required for sound telephone development, too much stress cannot be laid on this factor. Good commercial policy in telephony involves not only a correct rate scheme but proper education of the public, so as to extend steadily the use of the telephone and so as to ensure correct use of the service. The general efficiency of the service is largely dependent on good commercial organisation of the telephone administration. If telephone subscribers are left to go their own way, a large proportion of them will produce inefficient service for themselves and for others by misuse of their telephone equipment; and it is necessary continuously to educate subscribers so that they shall both obtain themselves and give to others an efficient service. The commercial policy of the telephone administration thus largely influences the engineering work, since the engineering work is necessarily affected by the rate of development of the system and by the efficient or inefficient use of the service by the public.

CHAPTER IX.

A SURVEY OF TELEPHONE DEVELOPMENT ON THE CONTINENT OF EUROPE.

*Spain, Portugal and the Near East. Switzerland.
Belgium. Holland.*

IN summarising the progress of the telephone in Continental Europe that progress has to be judged by the standards and principles above referred to, and it is unquestionably true that the development of the telephone service, its efficiency, and its general usefulness to the public are in the long run dependent on the application of the principles of technical and commercial policy which the experience gained in the development of the telephone in America has proved to be correct.

Spain, Portugal, and the Near East.

Climatic conditions and the natural and political characteristics of the people have assuredly their effect on the development of any technical industry, and one would not expect relatively backward countries like Spain, Portugal, Greece, and the Balkan States to have done much with the telephone ; and, as a matter of fact, those countries have done practically nothing. Actual Government monopoly and excessive Government restrictions have extinguished the possibility of private enterprise undertaking any active development. In Portugal an English company works a small system in Lisbon and one in Oporto ; in Spain various small French and Spanish companies and firms work, under rigorous restrictions and excessive royalties, a handful of small systems, of which the largest, in Barcelona, contains about 3,000 stations.

In Greece, Servia, Bulgaria, and Roumania, the telephone is a Government monopoly and is not developed at all. Roumania, the most progressive of the Balkan countries, has between 8,000 and 9,000 telephones for a population of 6,000,000. One or two of the exchanges in this group of countries have recently been equipped with central battery

switchboards, but with these exceptions the telephone plant in these countries belongs entirely to the experimental period of telephony, and the commercial policy is equally antiquated. It is quite true that in these countries the public is not so ready to take advantage of modern facilities as in the more active industrial countries, but nevertheless, if private enterprise were allowed fair opportunities, the development of the telephone in all of this group of countries might easily be increased tenfold within a very short time.

Switzerland.

In the telephonic survey of Europe I should next take a group of countries having some, although not too close a resemblance in general conditions and population, namely, Switzerland, Holland, and Belgium. Belgium and Holland have the advantage over Switzerland in the possession of great cities and in industrial wealth, but Switzerland has achieved the greater telephone development, having 20 telephones per thousand of population as against nine for Holland and six for Belgium. The telephonic history of Switzerland is interesting in several respects. The telephone became a Government monopoly practically from the beginning, as very little company work was done in Switzerland; but the Swiss Telegraph Department was fortunate in having men at its head who took an intelligent interest in the scientific side of telephony and realised the possibilities of the telephone.

The late Dr. Wietlisbach, Chief Engineer of the Swiss Telegraph Administration, was an accomplished student of telephone problems, and his scientific work—unhappily cut short by his early death—did much to give the telephone a good start in Switzerland, and to awaken for it more sympathetic attention from the Telegraph Administration as a whole than it has received in most other Continental countries. Unfortunately the telephone also attracted the attention of the politicians during its early days in Switzerland, and the Swiss Parliament forced on the Telegraph Administration telephone tariffs of such an unpractical character as seriously to impair the earning capacity of the telephone system.

In considering all European telephone tariffs it must be

borne in mind that the rates originally fixed were adopted when the telephone service was in its earliest stage of development, and these rates were based on supplying single wire service to very small groups of subscribers concentrated within a small radius of the exchange. Since the number of subscribers was small the traffic was also small. With the development of the telephone the circumstances have entirely changed. The whole plant is much more complicated than the crude single wire plants of the early days, the systems have spread out over much greater areas, and the average use of the service has greatly increased. The rates fixed in the early days of the business are therefore no criterion by which to judge telephone tariffs for the conditions of to-day.

In Switzerland the tariff was originally, as everywhere else, a flat rate tariff, but in 1889 a measured rate tariff, giving 800 free calls for the minimum rate, was introduced. At that time there were only 9,000 subscribers in the whole of Switzerland. The effect of the measured rate tariff was to cause the subscribers to cut down their use from an average of 1,310 calls a year to an average of 718, and a year later, when the measured rate tariff was completely in force, the average annual use of the service per subscriber fell to 546 calls. In 1896 a further drastic revision of the tariff was made and the 800 free calls were abolished, every call being charged for at the rate of 5 centimes. The subscriber pays extremely low maintenance rates, the first year of the contract the rate being 100 fr., the second year 70 fr., and the third and subsequent years 40 fr. Although the total number of subscribers in the Swiss local systems has risen from 20,000 to over 60,000 since this tariff was introduced, the average annual use per subscriber has only risen to 610 calls a year, or an average of about two a working day.

The chief causes of the extremely low telephone traffic in Switzerland are that there are no large cities in our sense of the term, and that the Swiss are an extremely frugal people. Distances are short, and the general conditions of life are simple. The charge for each individual call causes under these circumstances a greater check on the traffic than it would in other places. It is interesting to note, as already mentioned above, that the telephone has been developed in

Switzerland to such an extent that the telephone traffic and revenue now far exceed those of the telegraph. For the past year the telephone revenue in Switzerland was over 8,800,000 fr., as compared with 3,445,000 fr. from the telegraph; and whereas there were 1,572,000 internal telegrams there were 45,000,000 telephone calls, of which 8,000,000 were interurban calls, so that the interurban calls alone were five times as numerous as the telegrams. This is partly due to the fact that the Swiss Government have made telephone rates which compete with their own telegraph rates, as over 90 per cent. of the interurban calls were for the short distances, where the charge for a telephone call is less than that for a ten-word telegram.

The rates charged for the telephone service in Switzerland produce a revenue insufficient to permit the Administration to adopt improved plant with great rapidity, and except those of Berne and Geneva, recently converted to common battery, the systems throughout Switzerland have magneto equipment, and to a large extent single wire lines. The chief demand upon the long distance service is for connections between neighbouring places, and real long distance talking, of course, does not occur in Switzerland, so that the interurban plant is also comparatively simple. The fact that all the towns are of small population and area enables them to be served by single exchange systems, and the extremely low traffic makes the working of the exchanges very simple, so that it is easy to maintain a sufficiently high standard of service to satisfy the very moderate requirements of the Swiss public.

Belgium.

In Belgium the telephone business was started in 1879-80 by companies, but only short term licences were granted and almost all the company systems were taken over by the Government in 1893. Since the establishment of a Government monopoly the progress of the telephone in Belgium has been very slow; and as many old-fashioned features of telephone practice, such as flat rates, extra charges for metallic circuits, and single-exchange systems with mileage charges beyond a limited zone, have been retained, the utility and general development of the telephone have been artificially

restricted. In 1894 there were 8,500 subscribers in Belgium, and by 1910 the total has increased only to 42,540, whereas if the telephone service were conducted according to modern methods, Brussels or Antwerp alone would easily use as many telephones as the whole country uses now. Of recent years a number of local systems have been converted to common battery working, and the overhead single lines have been replaced by metallic circuit cables, but these reforms have been carried out very slowly, and antiquated plant has been retained in service long after it had become obsolete.

As with all Government monopolies, there is a total absence of commercial policy and of efforts to educate the public or to accelerate the development of the system; such growth as occurs is the normal increase due to people finding out for themselves that they want the telephone service. The adoption of measured rates has been discussed for some years in Belgium, but so far no active steps have been taken. This is always one of the great difficulties of Government monopolies—that proposals of the technical officials, who are versed in the real needs of the industry, are subject to review by politicians who have no expert knowledge whatever and are more often influenced by “political” motives than by practical and common sense reasons. It is well known that measured rates make both for the development and efficiency of the telephone service, but in all countries where flat rates have been retained up to now there is a sufficient body of large users (who consider they have a bargain in the flat rate) to raise a noisy agitation against a measured rate tariff; and in all countries politicians are more prone to be influenced by agitation than by truthful and practical reasoning.

Holland.

In Holland the early telephone work, both local and long distance, was undertaken by companies, principally by the Netherlands Bell Telephone Company, which is still in existence but on a much diminished scale. In later years it became the policy of the Dutch Government to operate the long distance service itself and to grant concessions for operating the local service to companies or to the municipalities.

Holland offers an example of a feature of the history of the telephone previously referred to. The early telephone companies failed to realise their opportunities and did not develop the business with sufficient activity and did not either keep their plant up to date or adopt modern tariffs and commercial policy. The result was that in the large cities the concessions to the companies were cancelled at the end of their original term and new concessions were granted to the municipalities of Amsterdam, Rotterdam, and the Hague; the municipalities built new systems and started the telephone business afresh, so to speak, in Amsterdam and Rotterdam in 1896, and in the Hague in 1902.

The Dutch Government has shown unusual liberality and common sense in these concessions, as no royalty is exacted from the telephone undertakings. Most other Governments have taxed the use of the telephone heavily by exacting a large contribution from the telephone undertaking in the form of a stiff percentage of the gross receipts. As in the long run this must be paid by the user of the service, the royalty becomes a tax on telephonic communication. This was apparently recognised in Holland, and no telephone royalty was demanded by the Government. The concessions were nevertheless surrounded by numerous regulations and restrictions, a most peculiar rule being that the area of each concession is confined to a circle having a radius of five kilometres (3·1 miles) from a point in the centre of the town. This results in the telephone undertakings having to refuse service to would-be subscribers situated in the outskirts of the towns.

Since the establishment of the new municipal systems the development of the telephone in Holland has been more rapid than previously, and the relative development is now substantially higher than that of its nearest neighbour, Belgium, being 9·3 telephones per thousand inhabitants for Holland, as against 6·1 per thousand inhabitants for Belgium. It is curious to observe, however, that considerable differences of practice occur in the three municipal systems of Amsterdam, Rotterdam, and the Hague in almost all respects—in technical methods, in the tariffs, and in general practice—although the three towns are only a short distance apart and must have a constant interchange of population. This lack of uniformity

in telephone practice is a serious inconvenience from the public point of view, though it frequently is observed where the general direction of the telephone service is not in expert hands. Up to the present no measured rate tariff has been introduced in Holland; it has been strongly advocated, but the semi-political control of municipal management favours the retention of flat rates, which, superficially at any rate, benefit the large user at the expense of the small. Of recent years common battery working has been adopted in the three large Dutch cities and the service has been materially improved. In Rotterdam this change was made only a year or so ago, and it was then found, so crudely had the original magneto plant been constructed, that it was necessary entirely to reconstruct the line plant, although the municipal system had been at work only about ten years.

There is a steady growth of the telephone in Holland, amounting to about 4,000 stations a year, or an annual increase of nearly 10 per cent., but it cannot be doubted that if the possibilities of the telephone were fully realised and if modern commercial practice, as well as a higher standard of technical practice, were adopted, a rich industrial country like Holland would make a far greater use of the telephone than it does at present.

CHAPTER X.

A SURVEY OF TELEPHONE DEVELOPMENT ON THE CONTINENT OF EUROPE—(*continued*).

France and Germany. The effects of complete Government monopoly. Refusal to learn from the experience of others. Neglect of commercial principles and practice.

WE next come to the three great industrial countries of Continental Europe, France, Germany, and Austria-Hungary, and in each of them the telephone has had a sad history, considering the enormous opportunities these rich and largely populated countries, with their many great cities, offer for telephone development.

In France telephony is a slough of despond. The French bureaucracy, which, according to so keen an observer as Lord Rosebery, is "strangling France," has effectively strangled the French telephone service. The telephone was made a Government monopoly in France in 1889, and twenty years later it is described by most Frenchmen, and notably by those who have investigated it the most closely, as a national disgrace. The development is extremely low, the plant is largely antiquated, or where it has been renewed its efficiency is destroyed by bad organisation, the tariff is the tariff of the eighties, and the commercial practice is the rigid and cumbersome routine of the most bureaucratic of bureaucracies. The service, notably in Paris, which contains about a third of all the telephones in France, is a by-word with all Frenchmen. It is best to draw a charitable veil over the deplorable state of telephony in France, because in every respect telephone practice in France is the reverse of what it should be. At the moment of writing this, an announcement appears in the papers that the new Minister of Public Works is preparing a complete scheme of reorganisation of the French telephone service, which will be presented to Parliament next session, and it may be taken that progress with the telephone in France is all in the future, as nothing short of a complete reorganisation will place the telephone in France on even a moderate footing of efficiency.

Up to the present, France has been the most conspicuous example of the evil results of Government monopoly of the telephone service, because the country itself, with its many great cities and its great industrial activity, offers one of the finest fields in Europe, if not in the world, for the development of the telephone service. If the telephone in France were operated on commercial lines the present development could easily be multiplied tenfold. Paris, by reason of its peculiar area, and the wealth and activity of its population, comes next to New York as a favourable field for the development of the telephone. With a well-equipped and well-organised system, operated on commercial lines, Paris might easily have a system of from 200,000 to 300,000 telephones. It would be difficult to calculate the financial loss which the inhabitants of Paris daily suffer from the lack of adequate and efficient telephonic facilities.

Germany.

In Germany the telephone has always been a Government monopoly, and, as in other branches of industrial effort, the German Government has encouraged the development of the telephone on purely German lines without regard to the experience of other countries and without relying on external aid of any sort. The German Post Office has had its own rate schemes and its own ideas of technical practice in telephony, and has usually refused to adopt improvements devised in other countries until German manufacturers have been able to supply them, or imitations of them.

This tenacious adherence to purely domestic ideas and methods has resulted in seriously restricting the technical progress of telephony in Germany, and consequently in restricting the efficiency of the service. Single wire overhead line plant was largely maintained in service in Germany long after metallic circuit working and underground cable distribution had been generally adopted in other countries. Even to-day many of the German telephone systems consist largely of single wire overhead plant. When underground cables were introduced in some of the large cities they were constructed single wire instead of metallic circuit, and numbers of cables were laid in a mass in iron pipes of large section instead of

each cable being laid in a separate duct, which is correctly the standard practice of other countries. Technical mistakes of an equally far-reaching character were made in switchboard practice, and at the subscriber's end of the system a fundamental error was made in allowing subscribers themselves to install extension stations of all kinds and connect them to the exchange lines.¹

These various errors in technical policy have naturally resulted in a very low standard of efficiency in the German telephone service, and have made it necessary, as modern telephone practice has tardily penetrated into Germany, for the Administration to reconstruct entirely the large city telephone systems. It has been necessary not only to substitute underground metallic circuit cables for the overhead single wires, as was done in America and in England many years ago, but in some cases to substitute conduit systems and new metallic circuit cables for the old underground systems of large iron pipes with their masses of single wire cables. As magneto switchboards have gradually been replaced by common battery switchboards it has been necessary, of course, to remodel the subscribers' installations, and enormous difficulties have arisen from the heterogeneous collection of extension stations with which many subscribers had provided themselves under the lax practice of the Administration in allowing the public to attach their own telephones to the exchange system.

This process of reconstruction is still in progress in the large cities of Germany, and it will be many years before the German telephone service is equipped with a uniform style of plant, such as has for a long time existed in the United States. Under these circumstances the standard of efficiency of the telephone service in Germany is necessarily low, and the telephone does not occupy nearly so important a place in the business life of the country as it is capable of occupying.

In tariff questions and in general commercial policy the practice of the German Post Office has not been notably superior to its technical practice. For many years there was a universal flat rate, the same for the small village as for Berlin or Hamburg. This was fixed in the early days, before the growth of the telephone was foreseen, and being based

on the crude conditions of the overhead single wire telephone systems of the eighties, serving very small groups of subscribers, it was fixed at a comparatively low price. The result was that the service was very cheap in the large cities and comparatively dear in the small places, and a large development occurred in the cities, and, comparatively speaking, no development at all in the small places. In the cities the development was aided by the fact that no attention was paid to providing public telephone stations, and every shopkeeper and restaurant keeper was allowed to give his customers free use of the telephone. A revision of the tariff was made about ten years ago and a message rate tariff was introduced, giving much more moderate rates for small places and small users than had previously existed, and the flat rate was raised in some of the large cities.

Under this tariff considerable development took place in the smaller towns throughout Germany; but the German Administration in time discovered a feature of commercial telephony which has long been patent to all experienced telephone men, namely, that a measured rate tariff and a low flat rate tariff cannot be worked effectively side by side. The inevitable result is to divide telephone users into two classes, the extremely small users and people who want the telephone mainly for receiving purposes, and the moderate and large users. The former take the message rate and yield a very small revenue, and the latter take the flat rate, because it offers them a great bargain, and they do not yield a revenue corresponding to their use of the service. After several years' experience of the unsatisfactory results of a combined message rate and flat rate tariff the German Post Office finally resolved to abandon the flat rate altogether and to introduce a message rate tariff throughout Germany. A Bill was prepared to this effect and presented to Parliament, but has aroused so much opposition from the large users of the telephone service, who found themselves threatened with the abolition of the great bargain they have enjoyed for so many years under the flat rate, that it has not yet passed, and its fate is still uncertain.

It is interesting to contrast the results of complete Government monopoly of the telephone service in two such countries

as France and Germany. In both countries the officials have refused to avail themselves of the experience of those who have most effectively developed the telephone both scientifically and commercially, namely, the Americans. From the point of view of both American and British telephone practice 'the latter being largely modelled on the former', almost every technical error of omission and commission has been made in the telephone service of France and Germany ; but there is this to be said for the German Administration, that from the beginning they have made greater efforts to develop the telephone and paid greater attention to its possibilities than the French Administration, where the jealousy of the telegraph officials and the greater natural apathy of a French Government department have prevented serious and sustained efforts to develop the telephone service on a broad scale.

The result of the two different policies is that the relative development of the telephone in Germany in proportion to population is nearly three times higher than that of France. This is to some extent to be accounted for by the large number of private extension stations in the German systems previously referred to, but even allowing for these, the German telephone development is more than double that of France. This superior development is chiefly due to the introduction of measured rates in Germany, and to the much larger capital provided by the German Post Office for telephone development. In France the telephone system has been starved of capital, whether through political reasons or whether because, as is often publicly alleged, the French Chamber has lost confidence in the administration of the Post Office, it is not for an outside observer to determine.

In both countries the guiding principle of the telephone business—that high efficiency of service is the prime requisite—has been completely lost sight of. In neither country is the attention paid to telephone organisation, and especially to the organisation of the traffic branch, which the subject requires. As a result the efficiency of the service is naturally on a low plane, and in the long distance service it is accepted as a matter of course by the public that calls between important towns should habitually require several hours to complete.

CHAPTER XI.

A SURVEY OF TELEPHONE DEVELOPMENT ON THE CONTINENT OF EUROPE—(continued).

Austria-Hungary, Italy and Russia.

IN Austria-Hungary the development of the telephone is even lower than in France, and a beginning has not yet been made in the Dual Monarchy in supplying a modern and well-developed telephone service. The difficulties which have obstructed the telephone in Austria and Hungary, both countries which offer a great field for the most rapid means of communication, have been, as in other European countries, those arising from political control. A beginning was made by private companies, chiefly of English origin, but by 1896 the last of these had disappeared and the telephone service had been converted into a complete Government monopoly. Since then the antiquated tariffs adopted and the frequent political deadlocks which arise in Austria-Hungary have prevented any sound and rapid development of the telephone.

In Austria, for all places except Vienna, a tariff was adopted under which the subscriber had to pay the whole cost of building his line and then an annual rate for maintenance and for service. This effectively checked development, and the growth of the systems in the various Austrian towns soon almost ceased. In Vienna, on the other hand, the flat rate established in the early 'eighties, when the system was extremely small, was maintained long after it had become unprofitable; but owing to Parliamentary deadlocks the State Telegraph Administration was unable to obtain capital with which to develop the telephone system, so that the increase of subscribers which would naturally have occurred under a low flat rate could not be dealt with, and the progress of the Vienna system was extremely slow, the demand for service far exceeding the available facilities. This is a situation which frequently arises under Government monopolies; the telephone service is denied to a large portion of the public owing to capital not being forthcoming to provide for the

development of the telephone system even at a sufficient rate to cope with the ordinary public demand, unstimulated by any active commercial policy.

In recent years more enlightened efforts have been made to develop the telephone in Austria by the adoption of graduated rates and the abolition of the old practice of charging the subscriber with the capital cost of his line. Arrangements have also been made for the annual supply of a certain amount of capital for new telephone construction. By these measures the checks on the development of the telephone in Austria have been somewhat lessened, and more rapid progress is now being made ; but this is purely relative to the previous stagnation, and it will be many years before the telephone in Austria reaches even a moderate degree of development. The measured rate tariff proposed by the Austrian Administration a few years ago was at first strenuously resisted by the Press and by the section of the public which had so long enjoyed bargain rates for unlimited use, but a measured rate tariff, with some modifications of the original scheme, was eventually adopted and has had a marked effect in increasing the rate of development.

In technical practice the Austrian Administration has, like most Government monopolies, lagged several steps behind modern methods. When the Vienna system was rebuilt, a little over ten years ago, the common battery system was available, but was not adopted ; and although two spacious new telephone buildings were constructed and a new underground system on the drawing-in principle was laid down, the magneto system of working was adhered to and the equipment adopted for the exchanges was generally of an old-fashioned type. During recent years the Austrian Administration has been experimenting with the automatic telephone exchange, and it is proposed that a number of small towns shall be equipped with automatic apparatus, with the idea that if these installations successfully meet the requirements of the public the automatic system will eventually be adopted in the larger cities and in Vienna itself.

Hungary has its separate telegraph Administration, and the telephone branch has followed its own policy, and not imitated that of Austria. Outside of Budapest there is little develop-

ment of the telephone, and the development of the whole country is somewhat lower than that of Austria, and only slightly exceeds that of Italy, where the telephone is practically non-existent. In Budapest the telephone service was originally started by a company, but the State purchased the system after a few years and assumed the monopoly of telephone work. The system was reconstructed in 1903, and a large new telephone building put up, which is equipped with a common battery plant of the best American type. The low development and the slow progress of the telephone in Hungary are principally due to lack of capital, absence of commercial policy, and to the retention of the old flat rate tariff. For many years efforts have been made by the telephone officials to obtain the sanction of the Government to the adoption of a measured rate tariff, but so far the proposal has remained pigeon-holed.

Italy.

In Italy the telephone has hardly begun its career, there being only 62,000 telephones among a population of 33,500,000. The Italian Government has recently assumed an entire monopoly of the service, and has organised a State Telephone Department, separate from the Telegraph Administration—a plan which might well be copied by other Government monopolies, since the telephone industry undoubtedly suffers greatly from being under the control of telegraph officials. The telephone in Italy has its future all before it; efforts are being made to introduce modern technical practice and modern rate practice, and the future will show whether the new Italian State telephone department is capable of successfully developing the great field which undoubtedly exists for the telephone service in the many large cities of Italy.

Russia.

Russia is the last of the great European countries where the development of the telephone is extremely low, barely reaching one telephone per 1,000 inhabitants. Of recent years, however, very rapid progress has been made, notably in the three great cities, Moscow, St. Petersburg, and Warsaw. These three Russian cities offer another illustration of the fact already noted, that many of the early European tele-

phone companies failed to realise either their opportunities or their responsibilities. Telephone companies were established under licence from the Government in Moscow, St. Petersburg, and Warsaw in the early days, but the progress made was extremely slow, and as the end of the concession approached it was realised in all three places that the telephone companies had failed in their mission. The rates were high, the service was bad, and the development low. So congested was the system in St. Petersburg, for example, that merchants were willing to pay a high premium for the right to take over a telephone line from a subscriber who was giving up the service.

These conditions may have arisen through onerous terms of the licences which prevented the companies from expending capital for development as the expiry of the licence approached; but since such conditions existed in the late 'nineties, when the possibilities of the telephone were well understood, and telephone practice, both technical and commercial, had been completely revolutionised, it looks as if the Russian companies had really failed to realise both their opportunities and their responsibilities towards the public. When the expiry of the original licences approached, the Russian Government, with a view to securing greater development, lower rates, and a higher efficiency of service, put up new concessions to competition, the competition to hinge upon the offer of low rates and of proper guarantees of an efficient service. In St. Petersburg the concession was obtained by the municipality, and in Moscow and Warsaw by companies organised by a group of Swedish, Danish and Russian capitalists.

These new concessions were granted in 1901, and work was begun in all three cities on the construction of entirely modern telephone plants, the common battery system being employed, with some modification in methods of operating due to local ideas. In all three cities the new systems came into operation between four and five years ago, and in each city the number of subscribers has increased about five-fold since the starting of the new services. Similar concessions were granted for Riga and Odessa, and new systems were constructed in those cities. The Russian Government, while hedging round these concessions with numerous restrictions

and retaining the right to purchase the telephone systems at the end of the licence, has adopted the broad-minded attitude of encouraging the development of the telephone for the benefit of the public and exacts from the concessionaires a royalty of only three per cent. on the gross receipts, which compares very favourably with the high royalties exacted by some other Governments.

The long-distance service in Russia remains in the hands of the Government, and is very undeveloped, Moscow and St. Petersburg being practically the only great cities connected by long-distance telephone lines. The distances between cities in Russia are very great, and the maintenance of long distance lines is admittedly very difficult, as the sparsely inhabited character of the country is very favourable to the operations of copper wire thieves ; the lines between Moscow and St. Petersburg are interrupted with great frequency from this cause.

CHAPTER XII.

A SURVEY OF TELEPHONE DEVELOPMENT ON THE CONTINENT OF EUROPE—(continued).

Sweden, Denmark and Norway. The scope allowed to private enterprise and the deferment of State monopoly have permitted higher telephone development in the Scandinavian countries than in the rest of Europe. State competition with private enterprise in Stockholm. Conclusion. The ineradicable defects of Government monopoly.

IT is in the Scandinavian countries that the telephone has had the freest and most rapid development in Europe, as already shown by the statistics given relating to Sweden, Denmark and Norway. This special position of the telephone in the three small Northern countries of Europe is due to several causes, the principal being, perhaps, that in those countries the Government had no legal monopoly in the telegraph, and therefore was unable to exercise the same amount of repressive control over private telephone enterprise at the beginning as was exercised in less fortunate lands. Private enterprise had freer scope than elsewhere, notably in Sweden and Denmark, and the telephone became well-established and its value thoroughly appreciated by the public before new legislation was enacted to increase the slender measure of control which the Government Telegraph Administration at first possessed.

Sweden, Denmark and Norway have not been complete exceptions to the usual story of political interference and unsympathetic control which have so grievously restricted the progress of the telephone throughout Europe, and the tendency now in all three countries is either for the State to obtain an actual monopoly, or so completely to regulate the operations of the remaining telephone companies as to cause them to become virtually State-managed concerns. In Sweden the State now has a monopoly outside of Stockholm, in Norway the State has acquired the company systems in

the principal towns and is acquiring others, and in Denmark the State, while leaving the active management still to the companies, dictates rates and regulations to such an extent that the companies have to adapt their policy to the exactions of the Government rather than to the requirements of the telephone business and of the public.

The comparative freedom from political control enjoyed by the telephone in Scandinavia in the beginning enabled many telephone companies, both large and small, to be started in all three countries, and the telephone seems to have "caught on" at once. Doubtless the simplicity and directness of telephonic communication appealed to such a practical people as the Scandinavians, while the relative scarcity of other means of communication, and the general conditions, such as small town areas, absence of other electrical construction and the cheapness of labour and material, were all factors favourable to rapid telephone development. The rates for telephone service in Scandinavia have always been cheap, and necessarily so, since the value of money there is high, and everything else is cheap when judged by English or American standards.

Many of the early Scandinavian telephone companies were small co-operative companies, in which the users were the principal shareholders. Numerous co-operative companies still exist in Norway and Denmark, but in Sweden they have all been absorbed either by the State telephone system or its great rival, the Stockholm Telephone Company. In the co-operative systems it has been usual for the subscribers to build and equip their own lines, generally using, for the sake of cheapness, iron wire and second-hand instruments, and to pay a small annual rate for exchange service and maintenance. In this way an extremely cheap telephone service has been obtained; the benefits of telephonic communication have been extended even to the most rural and sparsely settled parts, and the "telephone habit" has entered into the life of the Scandinavian peoples to an extent unapproached in other Continental countries.

To a very large extent, however, Stockholm has set the pace in matters telephonic for the whole of Scandinavia; and Stockholm owes its conspicuous place in the world of tele-

phony to the unbounded enthusiasm and the organising genius of the late Henry Cedergrén, whose early death those who knew him are still lamenting. Mr. Cedergrén founded the Stockholm General Telephone Company in 1882, and remained at its head until his death, which occurred in the spring of 1909. He was a telephone man of great enterprise and foresight, and of unlimited energy, and after having taken up telephone work he lived entirely for telephone work. He periodically visited America, and constantly imported into Sweden American telephone methods, and under his management Stockholm has become the best telephoned city of Europe. Had he been allowed free scope, Mr. Cedergrén would have developed the telephone throughout Sweden in the same active and enlightened manner, but the State Telegraph Department, jealous for the telegraph revenue, opposed his plans for building long distance lines, and obtained from Parliament powers and money to enable this work to be done by the Telegraph Administration.

The Telegraph Administration has since gradually acquired all the local telephone systems in Sweden except that of the Stockholm General Telephone Company, and has restricted the area of that Company to a circular district having a radius of 42 miles from Stockholm. Within this area there is strenuous competition between the State system, started in 1889, and the Company, but the latter has by far the best of the struggle, as the subscribers to the Company system outnumber those of the State system by more than three to one. The State Telegraph Administration has conducted a cut-throat competition, as it supplies service in Stockholm at an admittedly artificial rate—a rate lower than that which it charges in other smaller towns in Sweden—but notwithstanding this the Company maintains its preponderating position and steadily obtains the larger share of the new business. This active competition, which has now lasted for twenty years, has of course greatly stimulated the development of the telephone in Stockholm, and the extraordinary prevalence of the telephone there strikes every traveller as a distinct feature of that very attractive city. Not only has one two telephones—one of each system—in one's hotel bedroom, but one sees telephones literally every-

where, even down to the open-air refreshment stalls in public squares and gardens, and the trestle-benches in the fish market, which are in use for only a few hours each morning.

While the Stockholm competition has undoubtedly to a certain extent produced an artificial development of the telephone there—artificial for various reasons, but from the public point of view because every business man would prefer one uniform and well-developed system to two separate ones—the high standard of service maintained by the Stockholm General Telephone Company, its enlightened technical and commercial policy and its thorough organisation, have set a high standard of telephone work which is reflected throughout Scandinavia and has had its effect even on the telephone work of the various State Telegraph Administrations, which is noticeably better organised and equipped than that of other Continental countries.

Conclusion.

Whatever the reader's feeling may be, one cannot write even this brief and imperfect sketch of the history of the telephone in Europe without such a survey of wasted opportunities causing a sensation of the most poignant regret. It has been my lot to observe at frequent intervals during the past fifteen years the working of the telephone service in all its aspects in every European country, and I have even spent some time in arguing over "the telephone question" with the high political authorities of a country where there is at present no telephone service. All my observations and all my studies of the subject, during a continuous connection with telephony in America and in Europe, which now extends to over twenty years, or two-thirds of the whole life of commercial telephony, lead irresistibly to the one conclusion—that Government monopoly has strangled the telephone in Europe, checked its development, restrained its efficiency, limited its usefulness to the people. Like the Angel of Death, to paraphrase John Bright's famous speech on the Crimean war, the Government telegraph monopoly has overshadowed telephone progress throughout the length and breadth of Europe, and killed or maimed every effort made to give the telephone the widespread usefulness to the people of which we know it to be capable.

To compute the loss which the peoples of Europe have suffered, and still daily suffer, through being deprived of the highest possible development of the most rapid means of communication, would be impossible; it is an immense, incalculable loss, just as the gain in saving of time and friction which the community blessed with an efficient and highly-developed telephone service enjoys is immense and incalculable.

From the experience of America we know that an efficient telephone service, in which the greatest possible rapidity and certainty of communication over both short and long distances is made the governing principle, is capable of almost indefinite expansion—so deeply does this instantaneous means of communication enter into both business and social life. It may be asked—Why should not similar results, similar efficiency, and similar development be obtained under Government management? The best answer is the results of Government management in Europe during the past thirty years. The history of the telephone in Europe clearly shows that the “vested interest” of the Governments in the telegraphs has been allowed to check the natural advance of the telephone—the progress of the fittest has been artificially restrained. The growth of the brilliant and healthy youngster has been warped and stunted from mistaken regard for the less capable and less efficient elder brother.

Even if under Government ownership the management of the telephone were entirely separated from that of the telegraph, so as to eliminate this repressive influence, those who are familiar with the conduct of great Government departments, always necessarily subject to political control and political influence, would be the last to claim that a Government department can be an efficient substitute for private enterprise in the conduct of an industry where high efficiency, enterprising commercial policy, advanced technical policy, and sound and economical financial management are prime requisites for success. These are all the very antitheses of accepted Government methods; and, above all, the outstanding fact that under State management there is no man responsible for financial success or otherwise is sufficient always to prevent really successful and efficient working of a

commercial enterprise by Government management. Financial soundness in the end governs the whole thing—organisation, efficiency, commercial and technical policy—and the difference between the Government official and the business man is that the former need only produce accounts while the latter must produce the money. In the world of affairs, of iron and steel, brass and copper, steam and electricity, machinery, organisation and effort, it is not love that makes the world go round, but money.

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